

278

SERVICE MANUAL

AKAI TAPE RECORDER
MODEL **X-1800SD**

278

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	SCHEMATIC DIAGRAM (C)	

	SERIAL NUMBERS	MARK
(A) TYPE	00000 → 66477	()
(B) TYPE	66478 → 124677	(())
(C) TYPE	B-41203 →	(())

I. SPECIFICATIONS

STYLE	: Portable	MIC INPUT	: 0.5 mV - 20 mV
WEIGHT	: 37.4 lbs (17 kg)	Impedance 30 K.Ohms
DIMENSIONS	: 15" H x 13-1/2" W x 9-1/2" D (378H x 338W x 238D mm)	DIN OUTPUT	: 1.228 V (0 VU) by using 250 Hz recorded tape
POWER SUPPLY	: AC 100 to 240 V, 50/60 Hz	Impedance 1.5 K.Ohms
RECORDING SYSTEM	: Reel In-line 4-track stereo, monaural recording by using Cross-field Bias Head. Cartridge .. In-line 8-track stereo recording. Transfer ... Pre-recorded conventional reel tape can be dubbed on the cartridge tape.	DIN INPUT	: 20 mV Impedance 68 K.Ohms
PLAY BACK SYSTEM	: Reel In-line 4-track stereo, monaural play back. Cartridge .. In-line 8-track stereo play back.	FAST FORWARD AND REWIND TIME	: 90 seconds for 1,200 ft. tape at 50 Hz 75 seconds for 1,200 ft. tape at 60 Hz
TAPE SPEED	: Reel 3 speeds 1-7/8", 3-3/4" and 7-1/2" (15" with 15" adaptor kit) Cartridge 3-3/4"	MONITOR SYSTEM	: Can be monitored the program being recorded by using, Built-in speaker Stereo headphone External speaker
TAPE SPEED DEVIATION	: Within $\pm 3\%$	MOTOR	: Condenser starting induction two speed motor Horse Power 1/100 HP Power Ratio 70% Revolution 2,900 to 1,450 r.p.m. at 50 Hz 3,480 to 1,740 r.p.m. at 60 Hz
WOW AND FLUTTER (Play back only)	: Reel Less than 0.18% at 7-1/2" Less than 0.25% at 3-3/4" Less than 0.35% at 1-7/8" Cartridge Less than 0.35%	HEADS	: Condenser capacity 2.5 μ F at 50 Hz 2.0 μ F at 60 Hz
FREQUENCY RESPONSE	: Reel . 30 to 23,000 Hz ± 3 dB at 7-1/2" 30 to 18,000 Hz ± 3 dB at 3-3/4" 30 to 9,000 Hz ± 3 dB at 1-7/8" Cartridge 50 to 15,000 ± 3 dB	a. REEL REC/PLAY HEAD	: In-line 4-track stereo/monaural Gap 2/1000 mm Impedance ... 1,200 Ohms at 1,000 Hz
SIGNAL TO NOISE RATIO	: Reel Better than 50 dB at all speeds Cartridge Better than 45 dB	BIAS HEAD	: In-line 4-track stereo Gap 0.2 mm Impedance 500 Ohms at 60 K.Hz
DISTORTION (Total Harmonics)	: Reel Within 2% at 1,000 Hz 0 VU (Line output) Within 5% at 1,000 Hz 10 W (Main output)	ERASE HEAD	: In-line 4-track stereo Gap 0.2 mm Impedance 500 Ohms at 60 K.Hz
CROSS-TALK	: Reel Less than -65 dB (Monaural) Less than -43 dB (Stereo) Cartridge Less than -50 dB	b. CARTRIDGE REC/PLAY HEAD	: In-line 8-track stereo Gap 1/1000 mm Impedance 750 Ohms $\pm 15\%$ at 1000 Hz
ERASE RATIO	: Reel Less than -70 dB for all track Cartridge Less than -65 dB	ERASE HEAD	: In-line 8-track stereo Gap 0.1 mm Impedance 210 Ohms $\pm 10\%$ at 90 K.Hz
INSULATION RESISTANCE	: More than 50 M.Ohms	RECORDING LEVEL INDICATOR	: Vertical twin type VU meters
INSULATION DURABILITY	: 1,000 V. AC for more than one minute duration.	TRANSISTOR USED	: 2SC-650A x4 2SC-281B x4 2SC-458B x4 2SC-968 x2 2SC-1060 x4 2SC-971 x2
POWER OUTPUT		SILICON DIODE USED	: 10D1 x3 10D2 x4
LINE OUTPUT	: 1.228 V (0 VU) by using 250 Hz 0 VU Recorded Tape Impedance 1.5 K.Ohms	GERMANIUM DIODE USED	: IN-34A x 4
MAIN OUTPUT	: 6 W maximum per each channel at Music Power, total 12 W. Impedance 8 Ohms	REELS USED	: 7", 5", 3" reels
INPUT LEVEL		CARTRIDGE USED	: LEAR JET PAK 8-Track
LINE INPUT	: 60 mV - 2.5 V Impedance 150 K.Ohms		

II. MEASURING METHOD

TAPE SPEED DEVIATION

1. Method involving use of pre-recorded tape.

Playback on the tape recorder to be tested a tape pre-recorded at 1,000 cps $\pm 0.1\%$ for measuring tape speed deviation. Connect the appropriate output to a frequency counter meter in order to measure the tape speed deviation from the deviation of the measured frequency.

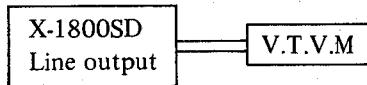
2. Method involving use of timing tape (designed for tape speed measurement).

This method utilizes a timing tape marked at intervals of 7-1/2". The running time of the tape over 60 marked section is measured in order to calculate the deviation of the tape speed. In applying this method, however, it should be born in mind that should the timing tape stretch or contract, measurement error is inevitable, so that it is necessary to measure the total length of the tape in advance.

WOW AND FLUTTER

Playback the 3,000 cps pre-recorded tape whose wow and flutter level is guaranteed to be smaller than 0.07% for measurement by means of a wow meter. It is also possible for a 3,000 cps sine wave to be recorded and played for measurement by means of the wow meter. In this case, however, the wow meter indicates a value as much as twice the value given in the specification on the first page.

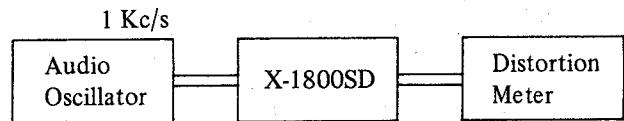
SIGNAL TO NOISE RATIO



Set the Equalizer Switch on "7-1/2" ips position and playback a tape containing a 1,000 cps sine wave recorded at "0" VU level on a standard recorder. Connect a V.T.V.M. to the line output jack of the recorder and measure its output.

Then remove the tape and measure the noise level under the same condition. Convert each of the measured values into decibels.

TOTAL HARMONIC DISTORTION FACTOR



Connect the measuring instrument as shown above, and record the 1,000 cps sine wave at "0" VU. Playback the resultant signal and measure the overall distortion factor. Measure the noise level of the tape recorder with the tape removed; connect the audio oscillator directly to the distortion meter for measurement of the distortion factor of the oscillator.

The required distortion factor may be obtained from the results of the above measurement by the following formula.

$$d_0 = d - d_1 - d_2$$

where, d_0 = Required

d = Overall distortion factor

d_1 = Noise level

d_2 = Distortion factor of the oscillator

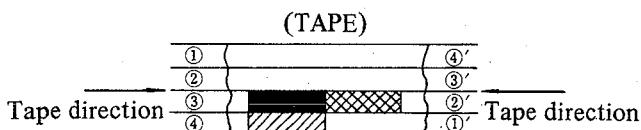
(Note : New tape of particularly good quality should be used for measurement of the distortion factor.)

POWER OUTPUT

Playback a tape containing a sine wave of 1,000 cps recorded at 0 VU on a standard recorder.

Connect a V.T.V.M. to the line output jack of the recorder and measure the voltage at the output of the recorder to be tested.

CROSS TALK (Cross talk between the tracks)



As shown in the figure, first record a 1,000 cps sine wave on track No. 3 at +3 VU level. Next, remove the 1,000 cps input signal and record under a non-input condition.

Then, playback the tape on track No. 3 and No. 1 (reversed condition of tape) through the 1,000 cps B.P.F. (Band Pass Filter, Sensitivity . . . 1:1) and obtain a ratio between the two from the following formula.

$$C = 20 \log \frac{E_0}{E_2 - E_1} \text{ (db)}$$

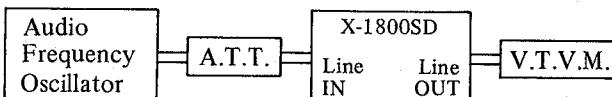
C =Desired crosstalk ratio (db)
 E_0 =1,000 Hz signal output level
 E_2 =1,000 Hz crosstalk output level
 E_1 =No-input signal record level



PLAYBACK :

- 5) Set the Record/Playback Knob in to "Play" position.
- 6) Set the Equalizer Switch on 7-1/2" or 3-3/4" position.
- 7) Connect a V.T.V.M. to the Line output.
- 8) Playback the tape previously recorded.
- 9) Adjust the output level to "0" dbm at 1,000 cps as indicated on the V.T.V.M. by the range selector of a V.T.V.M.
- 10) Playback the recorded spot frequencies with the conditions in (9); make a memo of output level and plot the value on a graph.

FREQUENCY RESPONSE



Connect the measuring instrument as in the above diagram, and measure the frequency response in the following sequence :

RECORD :

- 1) Give a sine wave of 1,000 cps to the Line Input of the recorder to be tested, through an attenuator from an audio frequency generator.
- 2) Set the Record/Playback Knob in to "Rec" position and adjust the line input volume so that the VU meter needle indicates "0" VU.
- 3) Under the condition described in (2), lower the input level 10 db by means of the attenuator.
- 4) Record the spot frequency in the range of 30 cps to 25,000 cps from the audio frequency generator.

III. CONTROL LOCATIONS

Cycle Conversion Switch (A)

Capstan Storage Post

Supply Reel Shaft

Track Selector

Head Cover (A)

Tape Guide

Tape Cleaner

Release Button

Head Cover (B)

Index Counter

Reset Button

Tone Control (Right)

Volume Control (Right)

Equalizer Switch

Tone Control (Left)

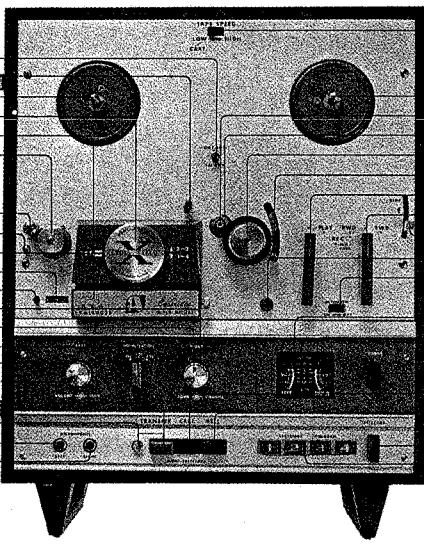
Volume Control (Left)

Transfer Button of Mode Selector

Transfer Safety Button

Microphone Jack (Left)

Microphone Jack (Right)



Speed Change Switch

Take-up Reel Shaft

Capstan

Capstan Shaft

Pinch Wheel

Automatic Shut-off Lever

Record/Playback Knob

Fast Forward/Rewind Knob

Instant Stop/Pause Lever

Recording Safety Button

Automatic Shut-off Switch

VU Meter (Left Channel)

VU Meter (Right Channel)

Power Switch

Cartridge Button of Mode Selector

Reel Button of Mode Selector

Cartridge Program Selector Button

Cartridge Program Indicator Lamp

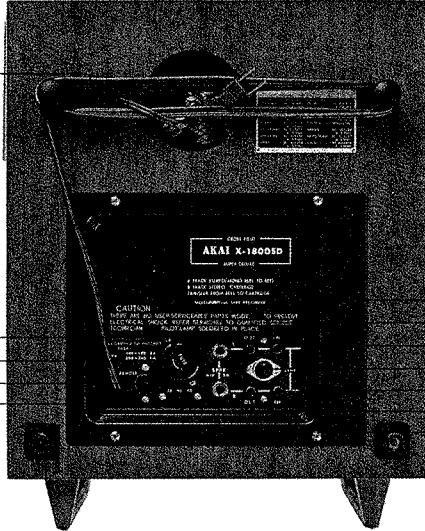
AC Cord

Voltage Selector

Fuse Post

Remote Control Jack

Cycle Conversion Switch (B)



External Speaker Jack (Left)

Line Output Jack (Left)

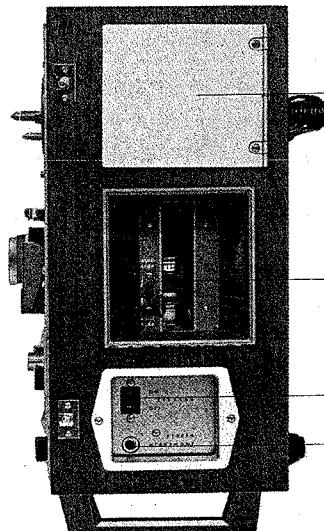
Line Input Jack (Left)

DIN Jack

Line Input Jack (Right)

Line Output Jack (Right)

External Speaker Jack (Right)



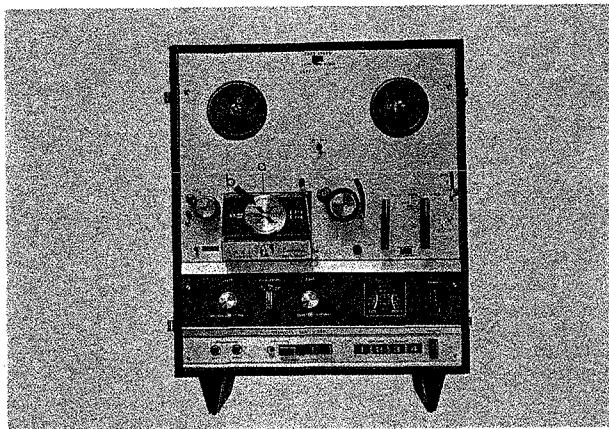
Speaker Reflector

Cartridge Automatic Stop Switch

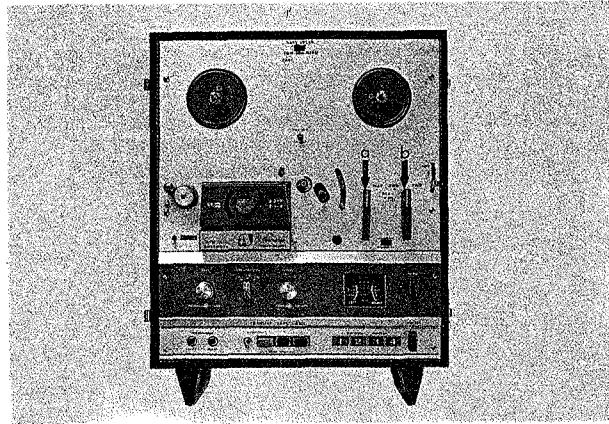
Speaker ON/OFF Switch

Stereo Headphone Jack

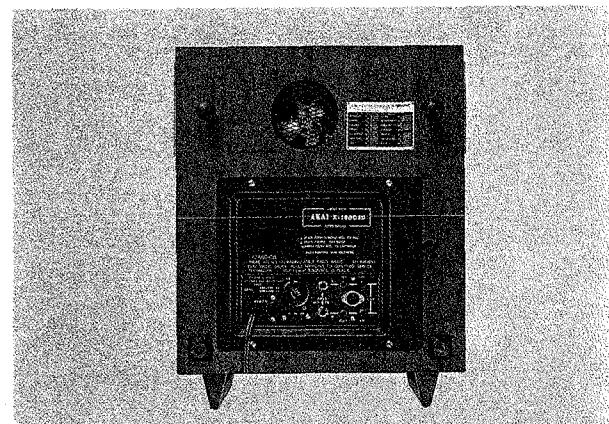
IV. DISMANTLING OF TAPE TRANSPORT UNIT & AMPLIFIERS



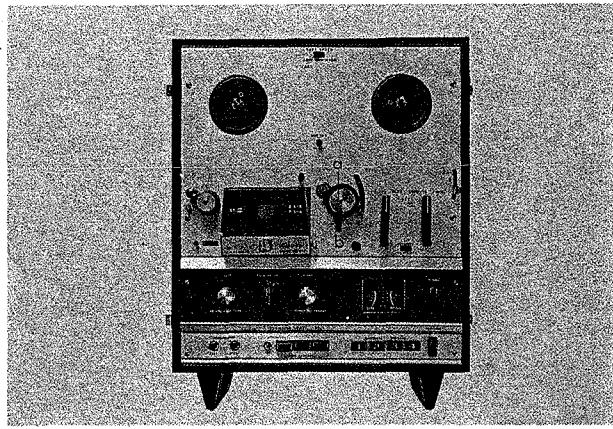
(1) Loosen the RETAINING SCREW (a) of the TRACK SELECTOR KNOB (b) using a philips-headed screw driver and remove the TRACK SELECTOR KNOB by hand.



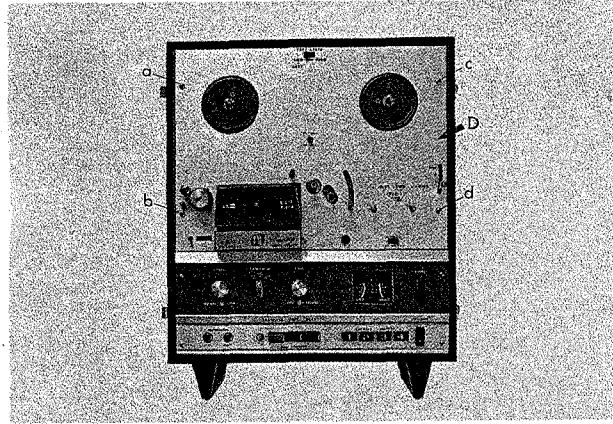
(3) Loosen the RETAINING SCREWS of the DECK CONTROL KNOBS (a) and (b) by using a philips-headed screw driver and remove the KNOBS by hand.



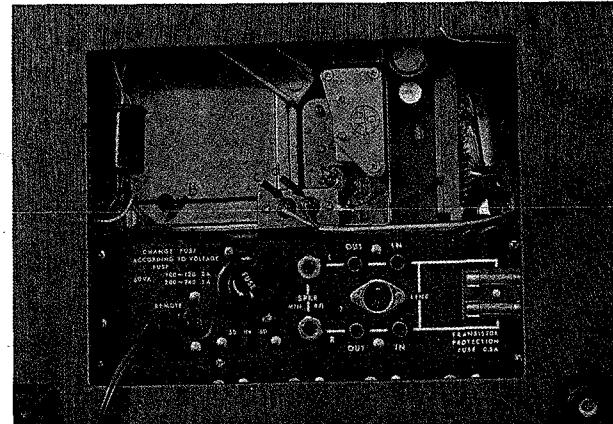
(5) Loosen the SCREWS (marked from (a) to (d)) by using a philips-headed screw driver and remove the BACK PANEL (B) by hand.



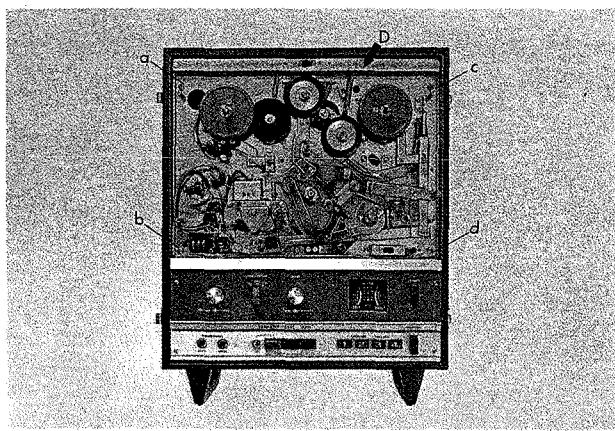
(2) Loosen the RETAINING SCREW (a) of PINCH WHEEL (b) using a philips-headed screw driver and remove the PINCH WHEEL by hand.



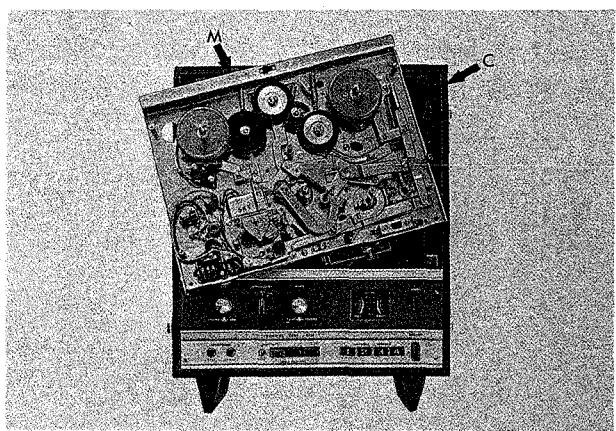
(4) Loosen the SCREWS (marked from (a) to (d)) by using a philips-headed screw driver and remove the DECK PANEL (D) by hand.



(6) Disconnect the PLUGS (marked from (a) to (e)) and (f) (18P Multi Jack) carefully by hand.



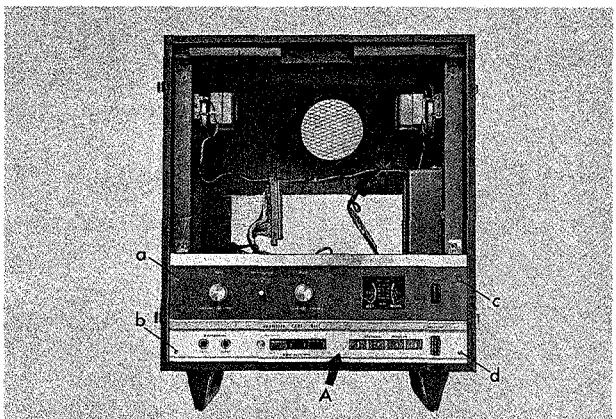
(7) Loosen the SCREWS (marked from ① to ④) of the DECK FRAME (D) by using a philips-headed screw driver.



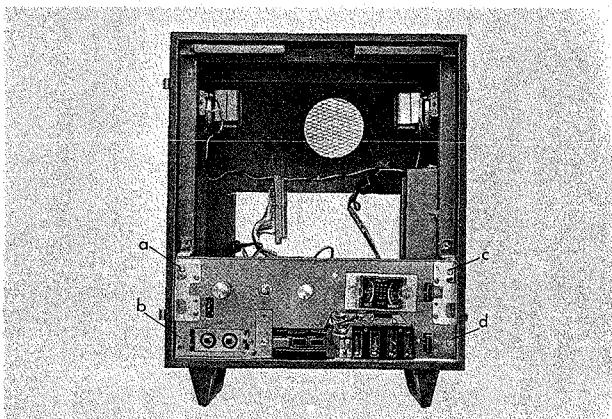
(8) Remove the TAPE TRANSPORT MECHANISM ASSEMBLY (M) by slowly lifting it from the CASE (C) as shown in picture.



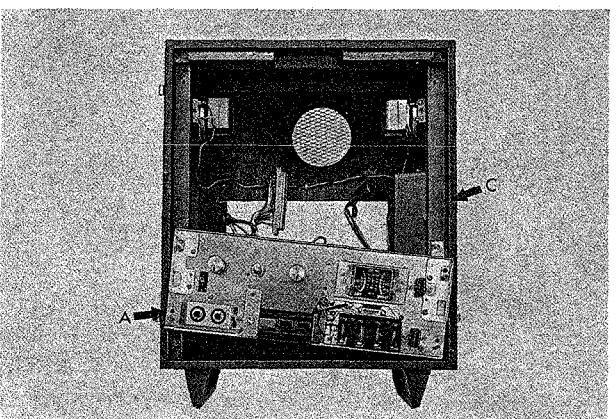
(9) Loosen the RETAINING SCREW ② of EQUALIZER KNOB ③ using a philips-headed screw driver and remove the KNOB by hand.



(10) Loosen the SCREWS (marked from ① to ④) by using a philips-headed screw driver and remove the AMPLIFIER PANEL (A) by hand.



(11) Loosen the SCREWS (marked from ① to ④) by using a philips-headed screw driver.



(12) Remove the AMPLIFIER ASSEMBLY (A) by slowly lifting it from the CASE (C) as shown in picture.

V. TRANSPORT MECANISM

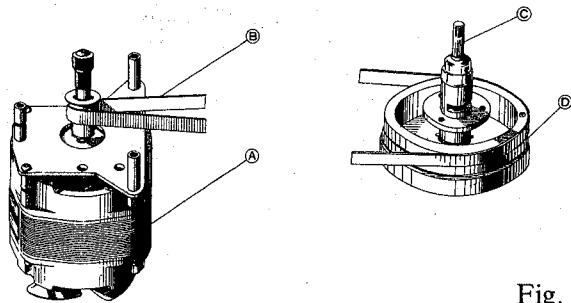


Fig. 1

DRIVING OF CAPSTAN

Figure 1.

- (A) Motor
- (B) Driving Belt (flat belt)
- (C) Capstan
- (D) Flywheel

High-speed rotation of *Motor* (A) is reduced by *Driving Belt* (B) and transmitted to *Capstan* (C), which is connected with flywheel with ample inertia. This enables the rated rotation to be attained by absorbing minor rotation distortion of the motor itself.

Capstan Rotation :

- 606 R.P.M. at 7-1/2" (19 cm) per sec.
- 303 R.P.M. at 3-3/4" (9.5 cm) per sec.
- 151.5 R.P.M. at 1-7/8" (4.75 cm) per sec.

Motor Rotation :

- 3,000 to 1,500 R.P.M. at 50 cps.
- 3,600 to 1,800 R.P.M. at 60 cps.

DRIVING OF PINCH WHEEL

Put tape between rotating capstan and pinch wheel, and push the pinch wheel against the capstan. This will transport the tape at rated speed. The appropriate pressure of pinch wheel is between 1,000 to 1,150 grams at the tape speed of 7-1/2" (19 cm) per second.

RECORDING AND PLAYBACK

Turn the RECORD/PLAYBACK KNOB (A) to "PLAY" position, and pinch wheel presses against capstan to move tape at the rated speed. At the same time, *Idler* (B) moves between *Motor Bushing* (C) and the *Take-Up Reel Spindle* (D) to transmit the *motor rotation* to (D) so that the tape is moved and wound on the take-up reel.

The Take-up Reel Spindle Base is made up of two plastic rollers (1 and 2) with a clutch felt in between. The Idler is rotating the *plastic roller* (2) underneath. Therefore, the tape-winding friction is adjusted by the slipping of the felt to maintain the winding of the tape.

On the other hand, the *Supply Reel Spindle* (H) has a *Brake Roller* (E) hung on the Plastic Roller (4) underneath, which provides appropriate back tension by the felt clutch slipping to the rotation of the Pulley (3) above.

To prevent accidental erasure, the *Record Interlock Button* (F) must be depressed before the RECORD/PLAYBACK KNOB can be moved to the "REC" position. The Safety device (G) is depressed to operate the recording mechanism.

(See figure 2)

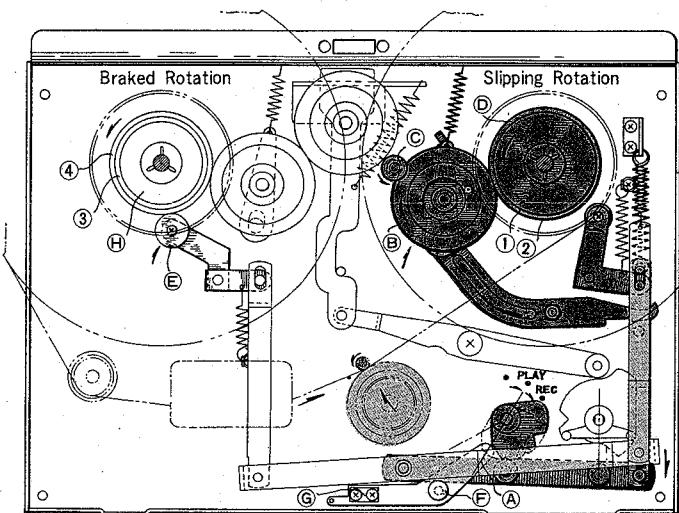


Fig. 2

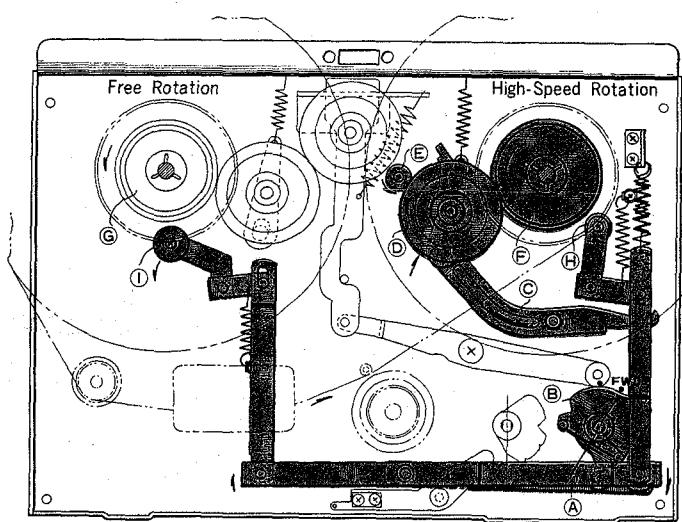


Fig. 3

FAST-FORWARD MECHANISM

Turn the *FAST FWD-REWIND* knob (A) to "FAST FWD" position, and the cam (B) under the knob pushes up the Lever (C). The Idler (D) moves into the space between the Plastic Roller (F) above the Take-Up Reel Spindle and the upper part of the rotating motor drive bushing to transmit the motor rotation to the take-up reel spindle. At the same time, Brake Rollers (H) and (I) come off the reel spindle to free the Supply Reel Spindle (G), thereby allowing fast winding of the tape onto the take-up reel.

(See figure 3)

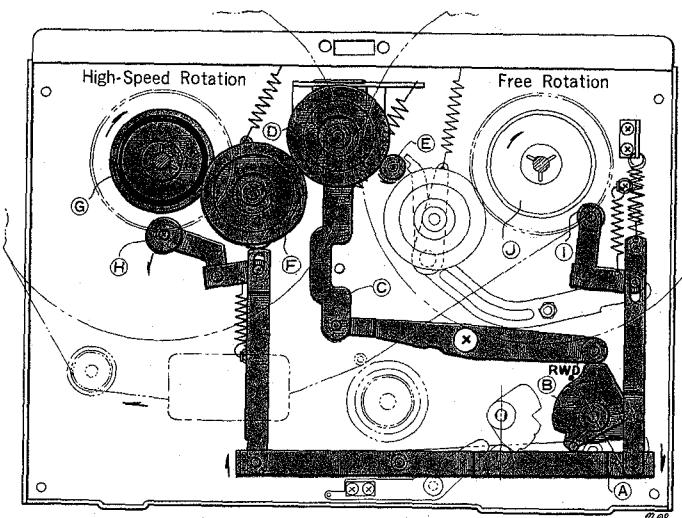


Fig. 4

REWIND MECHANISM

Turn the *FAST FWD-REWIND* knob (A) to "REWIND" position, and the cam (B) under the knob pushes the Lever (C) up. The Idler (D) moves into the space between the upper part of the rotating Motor drive bushing (E) and the Intermediate Pulley (F) to transmit the high-speed rotation of the motor through the intermediate pulley to the Supply Reel Spindle (G). At the same time, Brake Rollers (H) and (I) come off the reel spindle to free the take-up reel spindle (J), thereby rewinding the tape into the supply reel at a fast speed.

(See figure 4)

STOP CONTROL

Push the stop lever to "STOP" position, Brake Roller (A) and (B) depress reel spindles to stop rotation of the reel spindles.

As the brake rubber depresses the plastic rollers under the reel spindles, no friction is brought to bear on the tape itself.

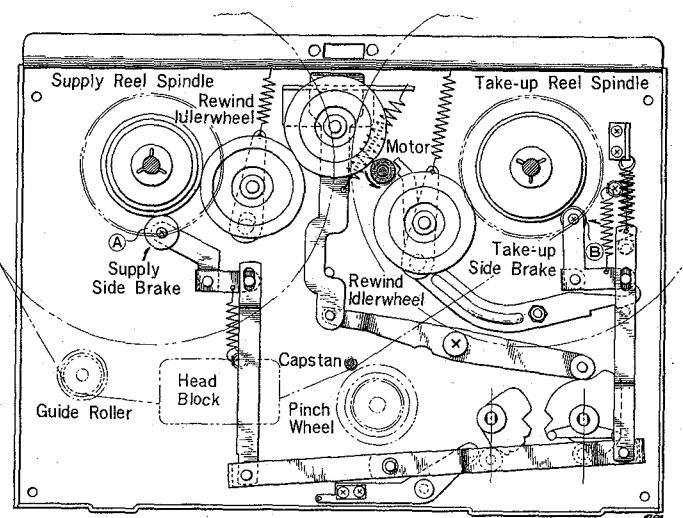


Fig. 5

Modes of Operation	Pinch Wheel	Take-up Idler Wheel	Rewind Idler Wheel	Take-up side Brake	Supply side Brake
(a) STOP	X	X	X	O	O
(b) FAST-FORWARD	X	O	X	X	X
(c) REWIND	X	X	O	X	X
(d) RECORDING PLAYBACK	O	O	X	X	O

NOTES : X-marks indicates "open" and
O-marks "engaged"

RECORD/PLAYBACK CHANGING MECHANISM ((A) TYPE)

By turning the RECORD/PLAYBACK KNOB (N) to the recording position, the CAM (a) pushes the RECORDING LEVERS (b), (c), (d) and (e), as illustrated in dotted line, then the RECORD/PLAYBACK CHANGING SWITCHES (SW1) and (SW2) turn to recording position. If the LEVERS (b) and (c) do not push the LEVERS (d) and (e) properly, the (SW1) and (SW2) do not operate properly, so abnormal oscillation may occur and also recording cannot take place.

The LEVER (c) must be adjusted to proper position by checking the SCREWS (f) and (g).

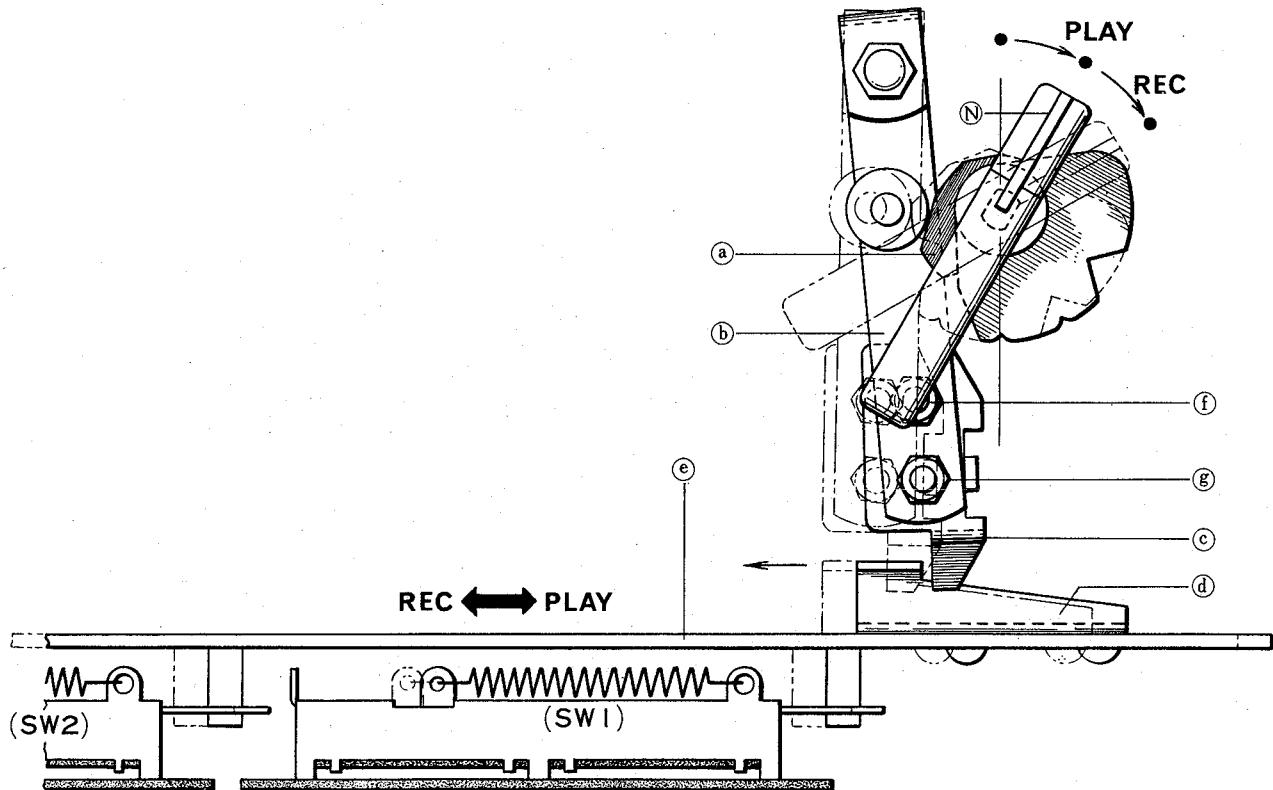


Fig. 6 OLD TYPE

RECORD/PLAYBACK CHANGING MECHANISM ((B) (C) TYPE)

By turning the RECORD/PLAYBACK KNOB (N) to the recording position the CAM (a) pushes the RECORDING LEVERS (b), (c) and (d), as illustrated in dotted line, then the RECORD/PLAYBACK CHANGING SWITCHES (SW4-1) and (SW4-2) turn to recording position.

If the LEVERS (b) and (c) do not push the LEVERS (d) properly, the (SW4-1) and (SW4-2) do not operate properly, so abnormal oscillation may occur and also recording cannot take place.

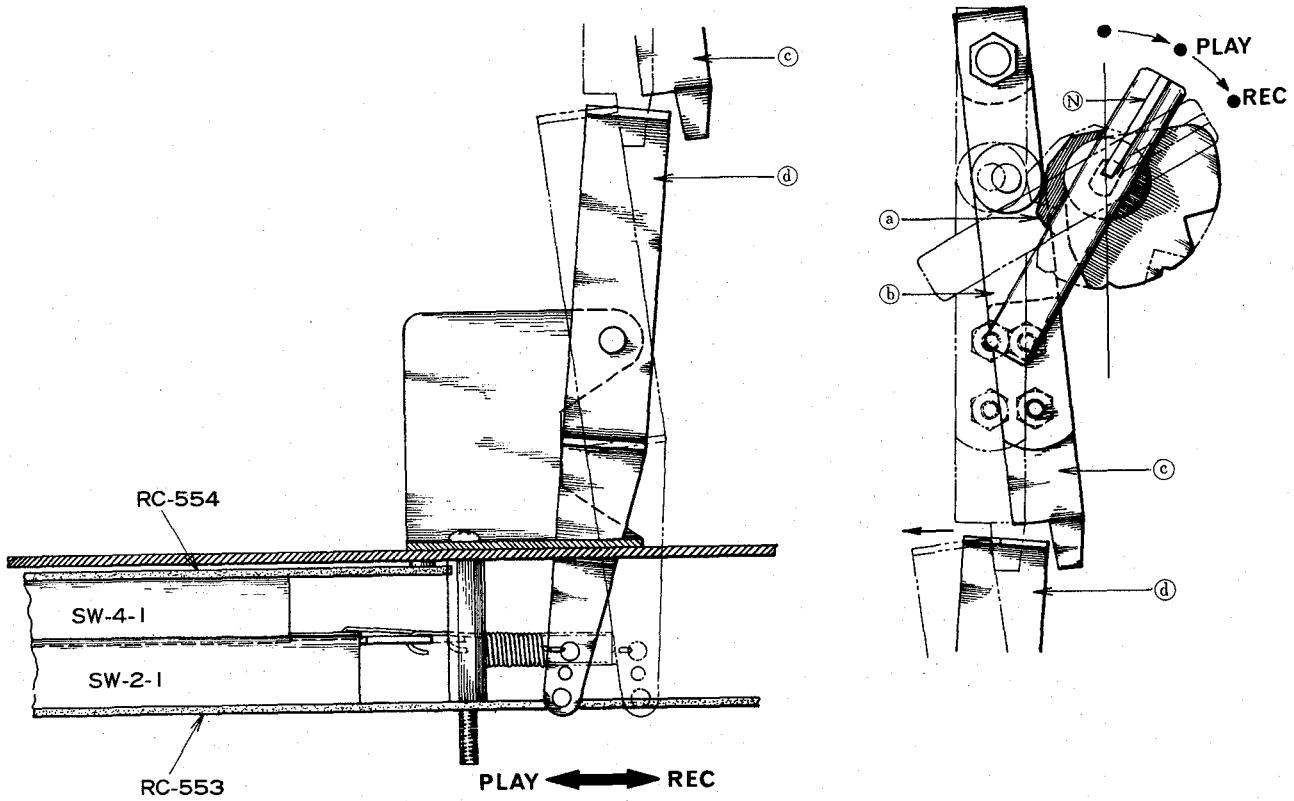


Fig. 6 NEW TYPE

VI. MECHANISM ADJUSTMENT

1. ADJUSTMENT OF PINCH WHEEL

It is important that the pinch wheel shaft is kept in complete alignment with the capstan shaft. A proper pinch wheel pressure is between 1,000 and 1,150 grams when the unit is operated at the tape speed of 7-1/2 ips. Any deviation from this specification will result in wow and flutter. Check pinch wheel pressure by a spring scale, and if necessary, adjust the pinch wheel load spring.

2. ADJUSTMENT OF TAKE-UP IDLER WHEEL

The take-up idler wheel must be kept in complete alignment with the take-up reel shaft. When the unit is set in fast forward condition, the idler wheel will contact with the upper knurled wheel of the take-up reel shaft assembly, and it will contact with the lower knurled wheel during record or play operation. Adjust idler wheel load spring so that the idler wheel pressure is kept between 50 and 80 grams. The idler wheel rapidly wears if the pressure is excessive. Slippage occurs if the pressure is smaller than the specification.

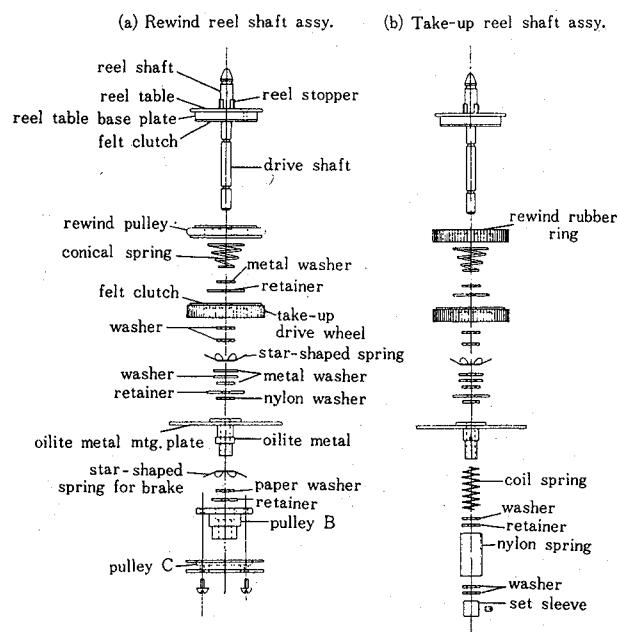


Fig. 1

3. ADJUSTMENT OF REWIND IDLER WHEEL

The rewind idler wheel must be kept in complete alignment with the rewind reel shaft. The amount of pressure on the knurled motor bushing should be maintained at about 50 grams during rewind operation. Adjust both the idler load spring and rewind roller.

4. ADJUSTMENT OF INTERMEDIATE WHEEL

The intermediate wheel is located between the rewind idler wheel and the rubber ring which is used on the upper part of the supply reel shaft assembly. When the unit is set in rewind condition, it will contact with these parts simultaneously transmitting torque of motor. An adequate pressure is 50 grams. Adjust the load spring of the intermediate wheel if the pressure is not sufficient.

5. ADJUSTMENT OF TAKE-UP REEL SHAFT ASSEMBLY

Felt clutch material is attached to the bottom side of the reel table base plate so that recording tape will not be stretched during fast forward operation because of excessive tension. To check the amount of friction of this part, place a 5-inch reel with a tape 60 m/m in diameter, and gently pull the end of tape upward using a spring scale. Adjust the conical spring so that the amount of tension at this part will be kept between 400 and 500 grams. Other felt clutch material is attached to the tape-up drive wheel. It is to provide proper slipping operation during record or play operation. The procedure for checking friction of this part is the same as the foregoing, and between 150 and 200 grams of friction will provide the best result. Adjust the star-shaped spring just under the take-up drive wheel. When the unit is set the rewind operation, the amount of friction of this part will be greatly reduced and will become 15 to 20 grams. Check to see whether this is satisfactory, if not, readjust the star-shaped spring for Brake, and the pressure of the spring retainer will be adjusted accordingly.

6. ADJUSTMENT OF SUPPLY REEL SHAFT ASSEMBLY

Felt clutch material is used between the lower side of the reel table base plate and the rewind rubber ring to protect recording tape from excessive tension during the rewind operation. To check the amount of friction of this part, place onto the supply reel table a 5-inch reel with a tape 60 m/m in diameter, and gently pull the end of tape upward by a spring scale. Adjust the conical spring so that the amount of tension is kept between 400 and 500 grams. Other felt clutch material is attached to the rewind drive wheel to provide proper slipping operation during record or play operation. The procedure for checking friction of this part is the same as the foregoing, and between 100 and 125 grams of friction will give the best result. When the unit is set to fast forward operation, the amount of friction will be greatly reduced and will become 15 to 20 grams. Check to see whether this is correct. If not, readjust coil spring and spring retainer washer. (See figure 1 (a) at left)

7. ADJUSTMENT OF HEADS

(A) Reel

a) Azimuth alignment of the Recording/Playback Head (See Fig. 2)

Playback an Ampex Alignment Tape 8,000 Hz at 7-1/2" tape speed and turn the screw (A) until the Line Out-Put Level reaches the Maximum.

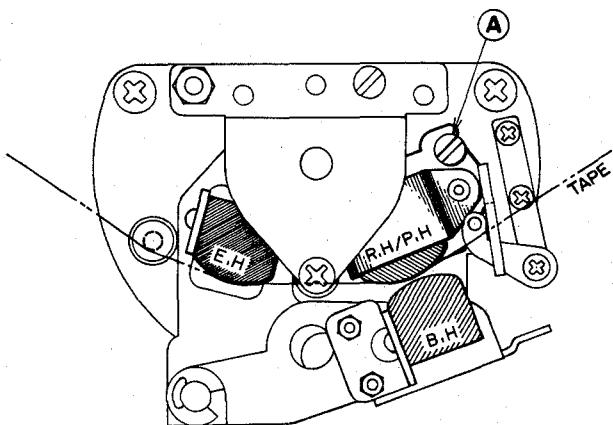


Fig. 2

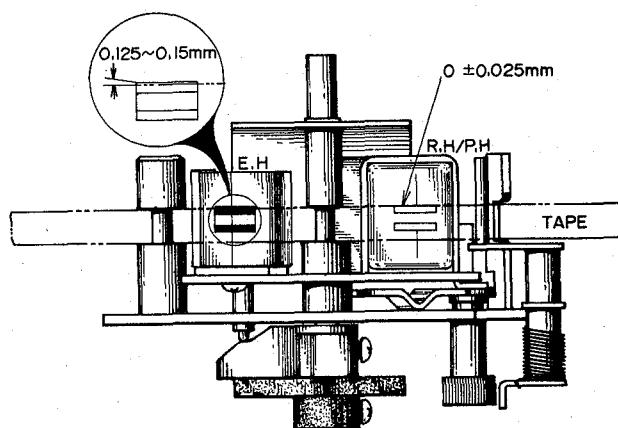


Fig. 3

b) Angle of the Bias Head (See Fig. 2 and Fig. 4)

Unfasten two screws and move the Bias Head by hand until the center line (d) of the Bias Head makes an angle of 90° with the direction of the tape. Then fasten screws.

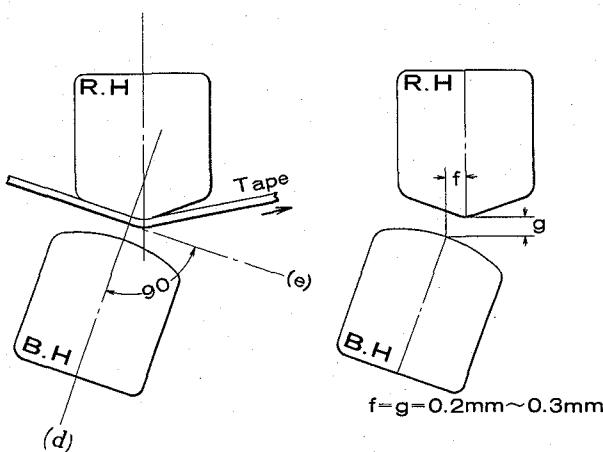


Fig. 4

Fig. 5

c) Clearance of the Bias Head (See Fig. 5)

Unfasten two screws and move the Bias Head by hand until the clearance (f) and (g) reaches 0.2 ~ 0.3 mm. Then fasten screws.

Note : If the clearance (f) and (g) becomes less than 0.2 ~ 0.3 mm, the Frequency Characteristic will be too low, but Distortion will decrease. If the clearance (f) and (g) becomes more than 0.2 ~ 0.3 mm, the Frequency Characteristic will be too high, but Distortion will increase.

(B) Cartridge

1) ADJUSTMENT OF AZIMUTH ALIGNMENT

Playback the test tape for azimuth alignment (8,000 Hz recorded tape) and set the azimuth alignment of head assembly by turning the screw (c) until maximum playback output of program 2 or 3 is obtained.

2) ADJUSTMENT OF HEIGHT

(A) Playback *the test tape and turn the screw (d) until the maximum gain of program 1 is obtained.

(B) Set *the blank test tape to the recorder and put to the erasing test. If the erasing is not complete, adjust it as follows :

(I) Turn the screws (a) and (b) clockwise forty-five degrees at the same time and then put to the erasing test again.

Note : Care should be taken to demagnetize the blank test tape every time you put to the erasing test.

(II) If the erasing is not completely done after the above adjustment, turn again the screws (a) and (b) clockwise ten to fifteen degrees at the same time.

(III) If not, continue as (2), till you can get complete erasing. And playback the test tape for azimuth alignment again and turn the screw (c) until the maximum gain of program 2 or 3 is obtained.

(IV) Playback again *the test tape and turn the screw (d) until the maximum gain of program 1 is obtained.

* TEST TAPE

This test tape is specially designed to make an adjustment of the height by AKAI.

Program 1 1,000 Hz

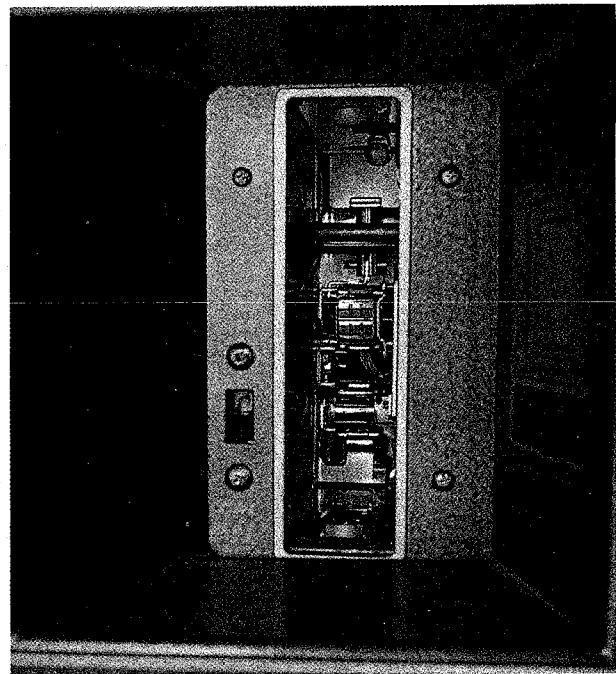
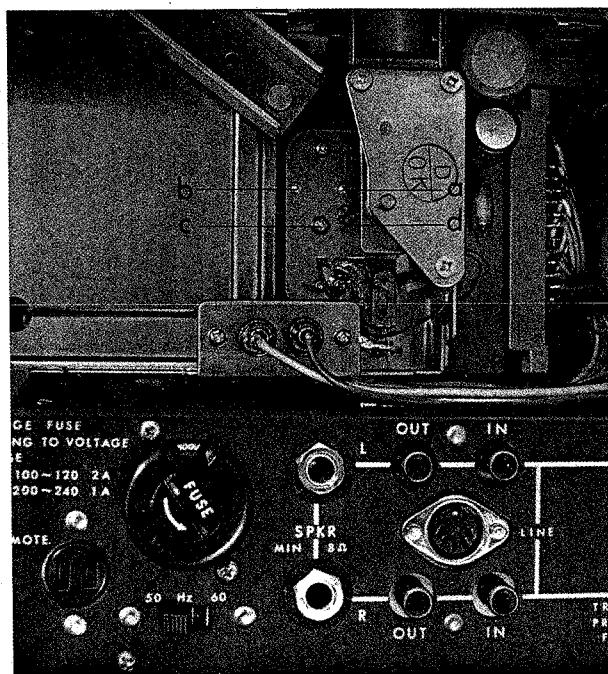
Program 2 Blank

Program 3 1,000 Hz

Program 4 3,000 Hz

* BLANK TEST TAPE

This blank test tape is specially designed to have one rotation at fifteen seconds.



VII. AMPLIFIER ADJUSTMENT

1. ADJUSTMENT OF RECORDING BIAS FREQUENCY (See Fig. 1)

- Put on the resistor 10 or 50 Ohms in series with the Bias Head and connect the Vertical Input Terminal of the Oscilloscope to points (a) and (b).
- Feed in the sine wave signal from an Audio Frequency Oscillator to the Horizontal Input of the Oscilloscope and tune the Dial of the Audio Frequency Oscillator until the Oscilloscope displays a circular or linear pattern. Then read the figure on the Dial of the Audio Frequency Oscillator.
- If it reads 60 K.Hz, the Recording Bias Frequency is correct.
- If it is not correct, it may be adjusted by inserting another condenser (C-401) ((C405)) value 7000 ((8000)) PF.

2. ADJUSTMENT OF RECORDING BIAS VOLTAGE

a) Reel (See Fig. 2)

Connect the V.T.V.M. to the point (a) and adjust the recording bias voltage by turning the V.A.C. in the bias oscillator circuit until it reads the voltage stamped backside the head assembly.

Note : There is no way of adjusting the erasing bias voltage, but the correct bias voltage is between AC 25 to 30 V.

b) Cartridge (See Fig. 2)

Connect the V.T.V.M. to the point (b) and if it not reads correct bias voltage between AC 12 to 15 V, it may be adjusted by inserting another resistor (R-103, R-104) ((R2-13)) value (180) ((220)) K. Ohms.

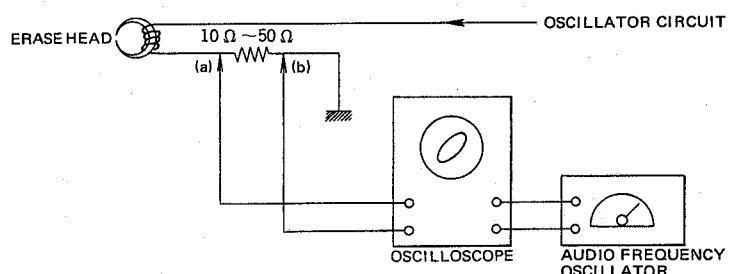


Fig. 1

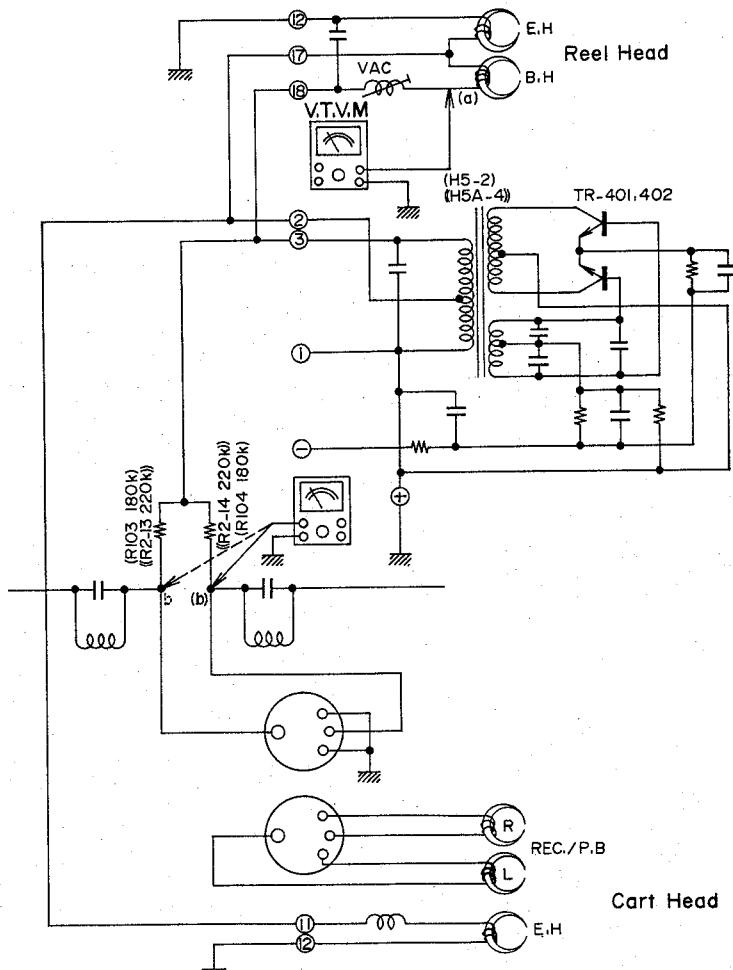


Fig. 2

3. ADJUSTMENT OF LINE OUTPUT LEVEL (Reel only)

(A) Play Back (See Fig. 3)

1. Push the Reel Button of Mode Selector in and turn the Volume Control (VR-2) ((VR0-1a, 10 KA)) up to the maximum position.
2. Set the Record/Playback Knob to "Play" position and the Equalizer Switch to 7-1/2".
3. Connect the V.T.V.M. (use one with Milli-Volt scale) to the Line Output Jack.
4. Playback the test tape (250 Hz "0" VU recorded) at 7-1/2" tape speed and turn the volume (VR-201) ((VR1-1)) (20 KB) until the Line Output level reaches +4 dB 1.228 V.

(B) Recording and Playback for REEL (See Fig. 4)

1. Connect V.T.V.M. to the Line Output Jack and put on a Scotch-150 blank tape.

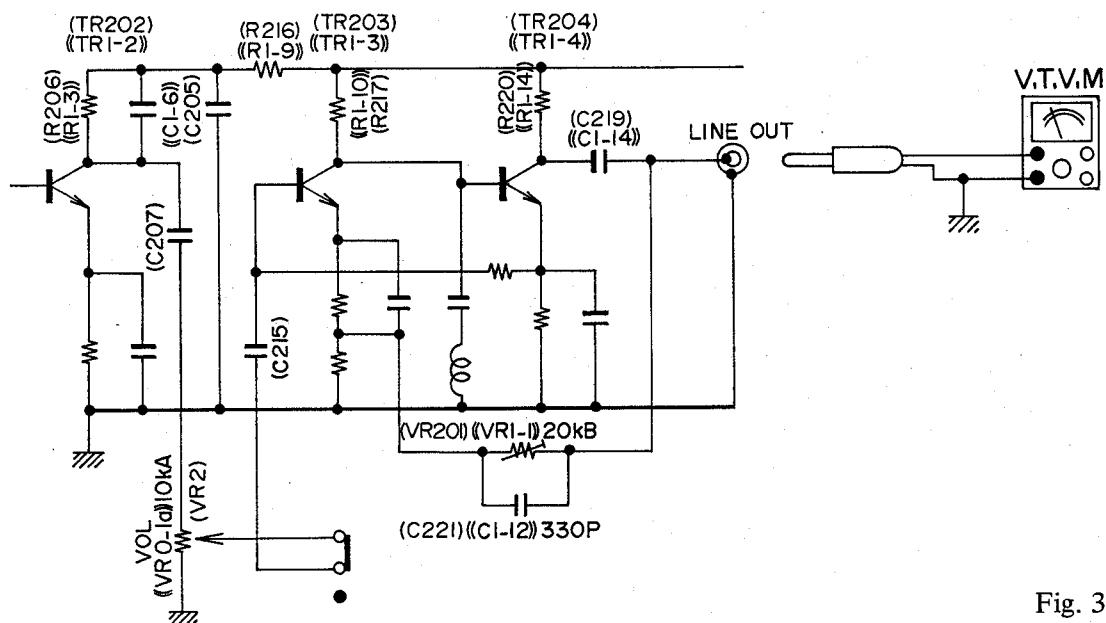


Fig. 3

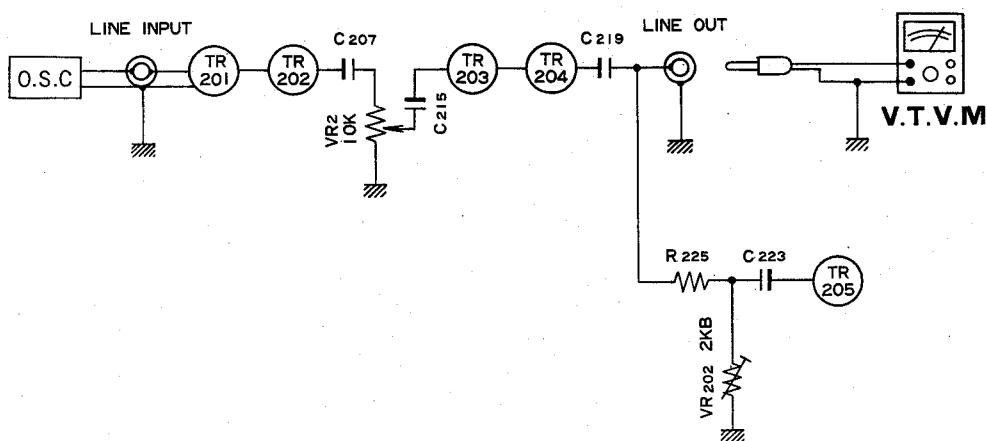


Fig. 4 OLD TYPE

2. Set the Record/Playback Knob to "REC" position and the Equalizer Switch to 7-1/2". Turn the Volume Control ((VR0-1a, 10 KA)) up to the maximum position.
3. Feed in a 1000 Hz sine wave signal from an Audio Frequency Oscillator through the attenuator to the Line Input of the X-1800SD and adjust the attenuator so that the VU Meter needle indicates "0".
4. After a few seconds of recording, rewind the tape back to the starting position. Then playback the tape.
5. If the Line Output Level does not reaches +4 dB 1.228 V, turn the Volume ((VR-202, 2 KB)) until the Line Output Level reaches +4 dB. Repeat this process 2 or 3 times as indicated in 3.

(B) (C) TYPE ONLY

(C) Recording and Playback for CARTRIDGE
(See Fig. 4)

1. Set the blank test tape to the recorder.
2. Depress the cartridge function switch and set the Record/Play Knob to "REC" position.
3. Follow the precess of (3) - (5) in (B). (Adjusting volume is VR2-1 10 K.ohm, this time.)
Line Output Level of Cartridge will be lower than the one of Reel. (-3, -4 dB is acceptable.)

Line Output Level of Cartridge will be lower than the one of Reel. (-3, -4 dB is acceptable.)

4. ADJUSTMENT OF D.C. COLLECTOR CURRENT FOR POWER TRANSISTORS 2SB463 WITH NO INPUT SIGNAL (See Fig. 5)

- Disconnect the wire between points (a) and (b).
- Connect the Ampere Meter (use one with Milli-Ampere Scale) to the points (a) and (b).
- Connect the V.T.V.M. (use one with Milli-Volt Scale) to the points (a) and (c), (c) and (d).
- Turn the Volume Control (VR-2) ((VR0-1a)) (10 KA) back to the minimum position.
- Turn the Volume (VR-301) ((VR3-1) and (VR-302) ((VR3-2)) (300-B) until the D.C. Collector Current reaches 18 mA and both of V.T.V.M. shows the same value approximately 14 V.D.C. at the same time.

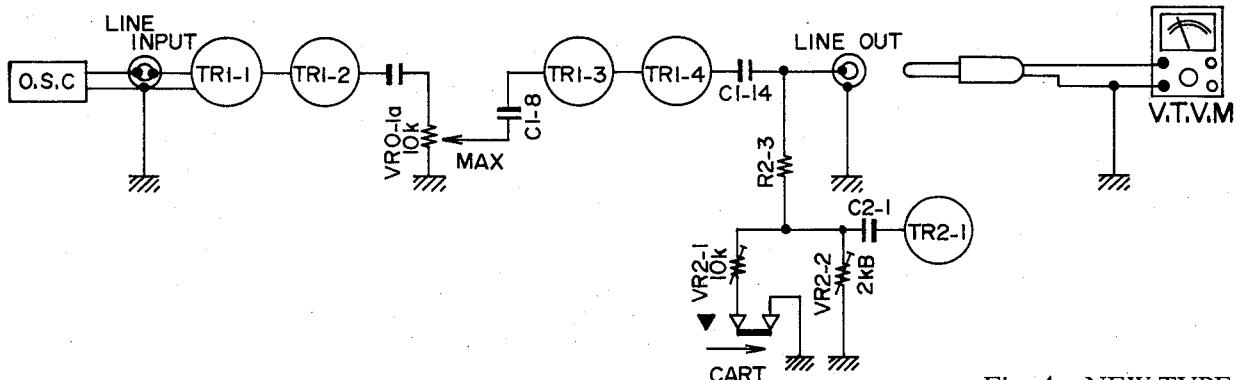


Fig. 4 NEW TYPE

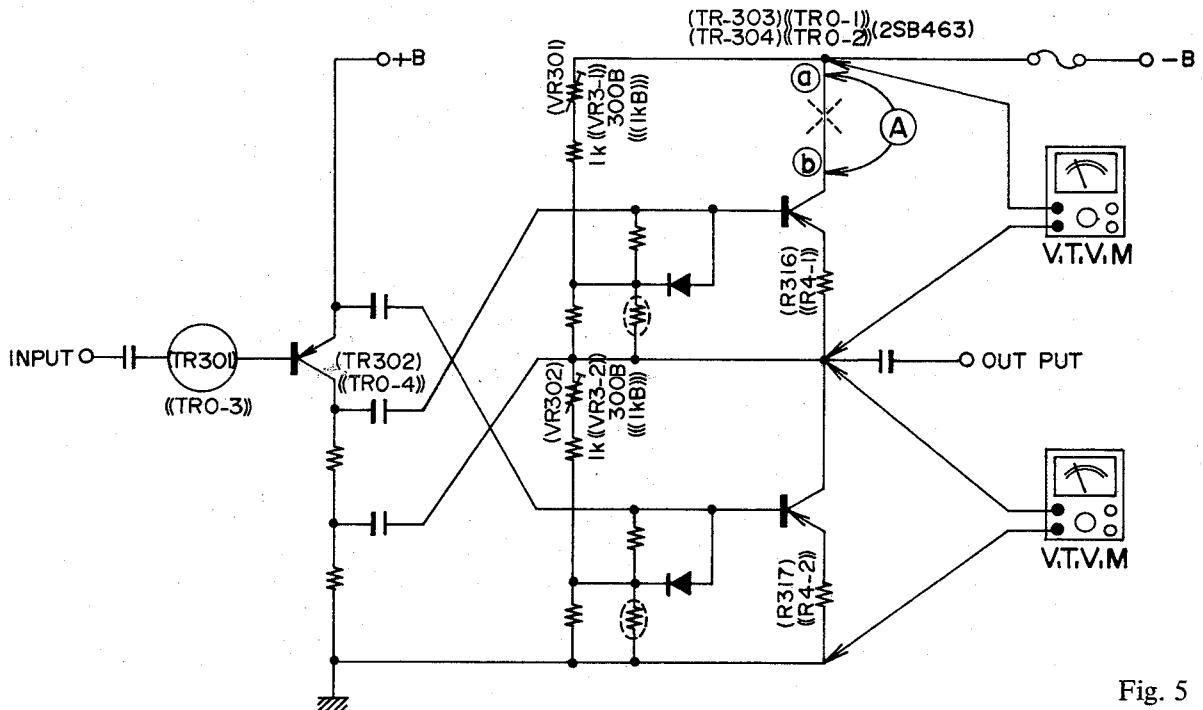


Fig. 5

VIII. MAINTENANCE PROCEDURES

1. LUBRICATION INSTRUCTION

For maximum service life and optimum performance, lubricate the parts identified below after each 500 hours of operation. Use only light machine oil of good quality.

Motor

Flywheel Assembly

 Rewind Idler Wheel and Wind Take-Up Idler 1 drop

 Intermediate Idler 1 drop

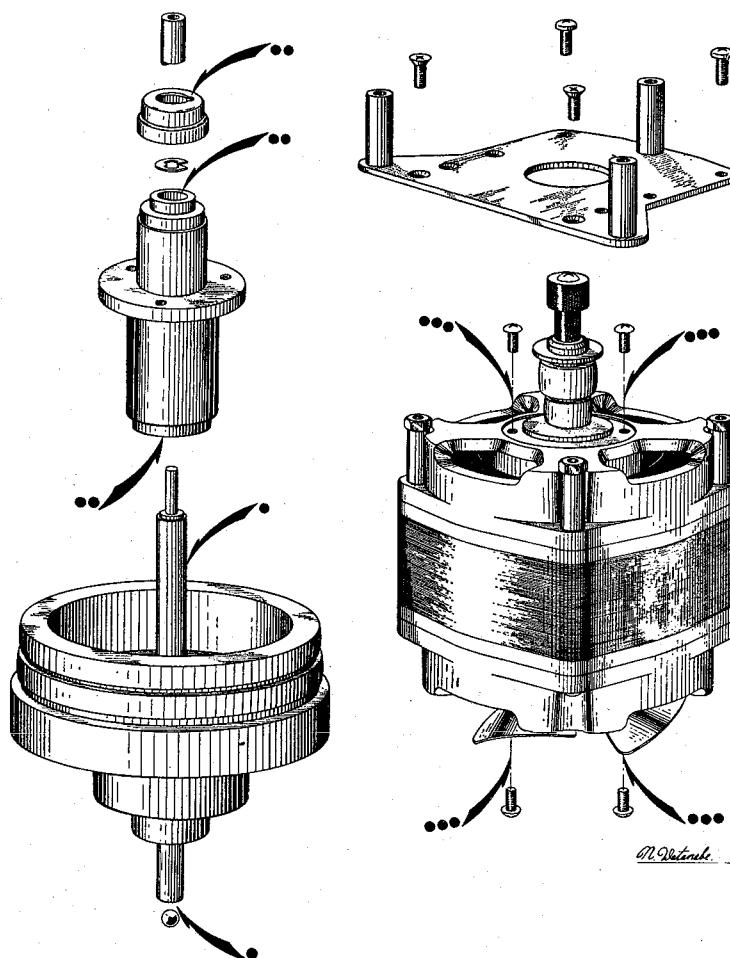
 Pinch Wheel 1 drop

Also apply a liberal film of light machine grease to each roller surface of all levers and cams.

CAUTION : DO NOT OVER-LUBRICATE, AND WIPE OFF EXCESS OIL WITH A COTTON SWAB SOAKED IN ALCOHOL. OTHERWISE, THE EXCESS LUBRICANT MAY BE SCATTERED DURING OPERATION, AND THE RUBBER COMPONENT PARTS WILL DETERIORATE.

2. CLEANING TAPE HEADS AND OTHER PARTS

Wipe surface of tape heads, guide roller bearing, capstan bushing and pinch wheel periodically with a soft cloth soaked in alcohol or carbon-tet.



FLYWHEEL

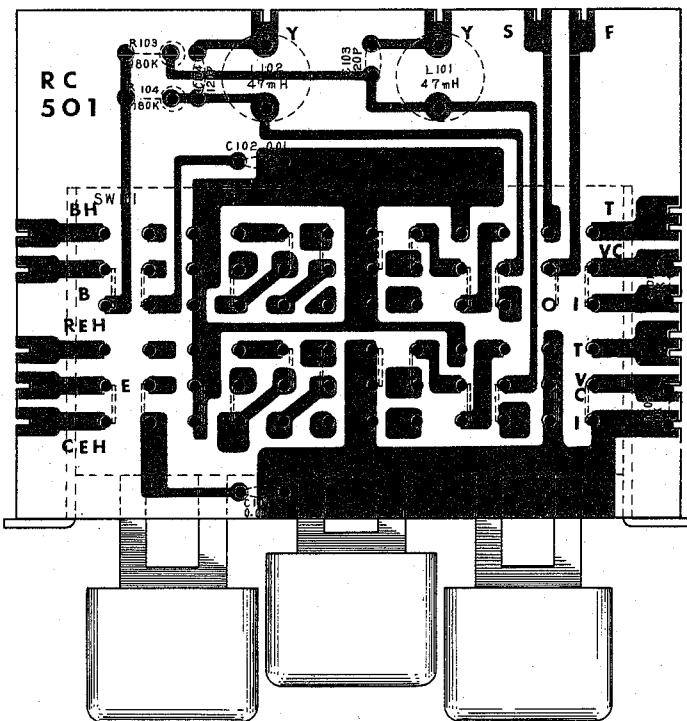
● 1 drop

MOTOR

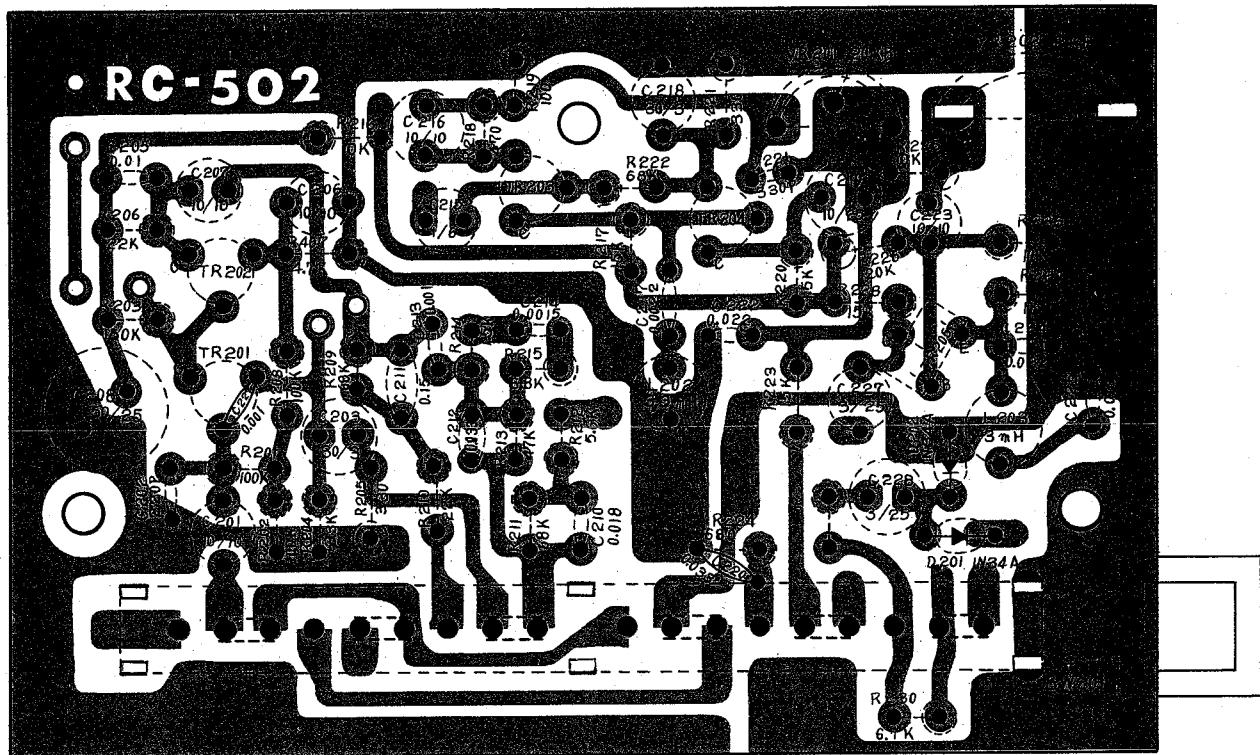
IX. COMPOSITE VIEWS OF COMPONENTS

TYPE CARD	(A) TYPE 00000 → 66477	(B) TYPE 66478 → 124677	(C) TYPE B-41203 →
RC-501 (SWITCH)	○		
RC-502 (P.B./REC)	○		
RC-550 (P.B.)		○	○
RC-503 (MAIN AMP.)	○		
RC-551 (MAIN AMP.)		○	
RC-589 (MAIN AMP.)			○
RC-554 (MAIN CHASSIS)		○	○
M9-504 (O.S.C.)	○	○	
MR-505 (O.S.C.)		○	○
RC-553 (REC/MODE SWITCH)		○	○
RC-555 (LAMP)		○	○
CART. HEAD Assy.	○		
CART. HEAD Assy. (RC-79)		○	○
CASE (Connector Left Side)	○		
CASE (Connector Right Side)		○	○
SCHEMATIC DIAGRAM (A)	○		
SCHEMATIC DIAGRAM (B)		○	
SCHEMATIC DIAGRAM (C)			○

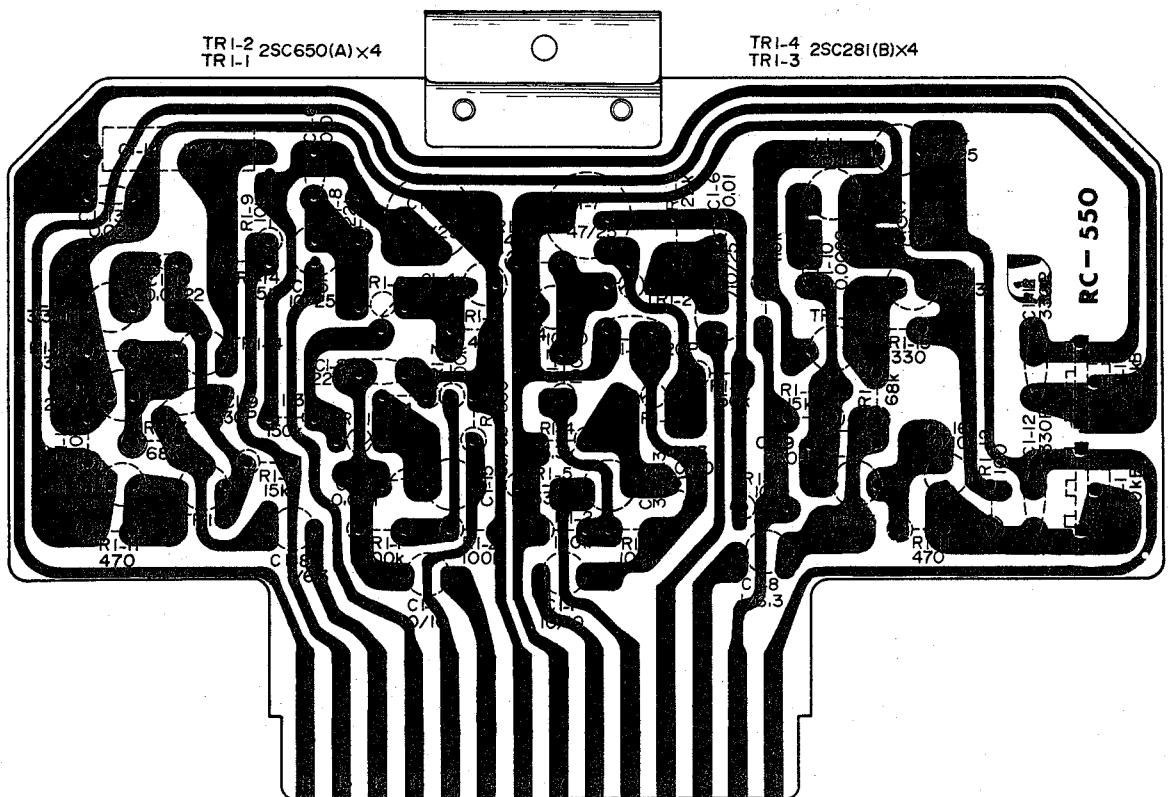
**RC-501 SWITCH PRINTED CARD
((A) TYPE)**



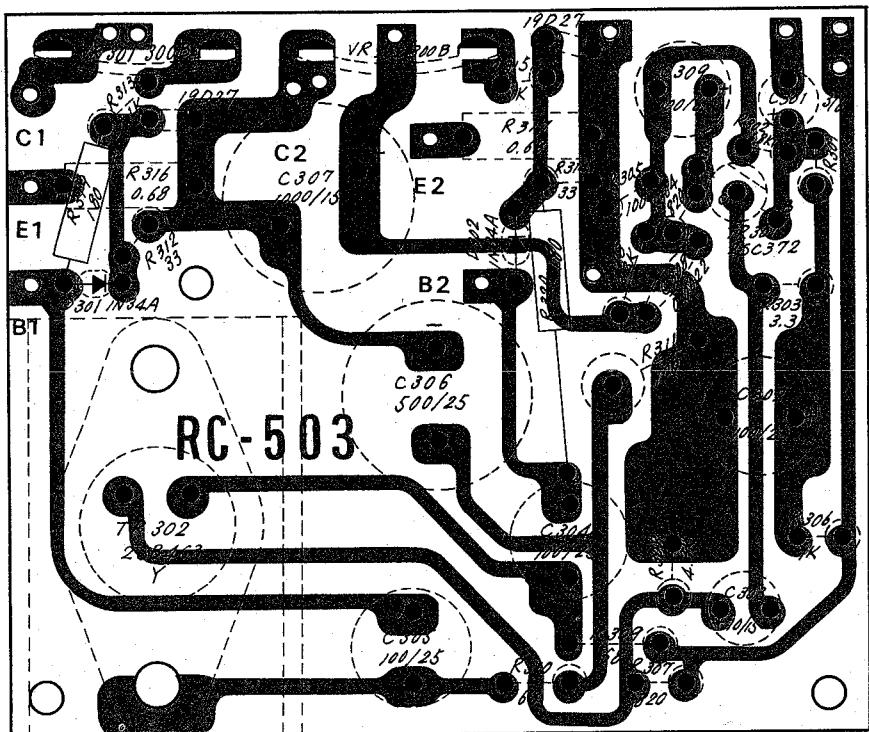
RC-502 P.B./REC. PRINTED CARD
((A) TYPE)



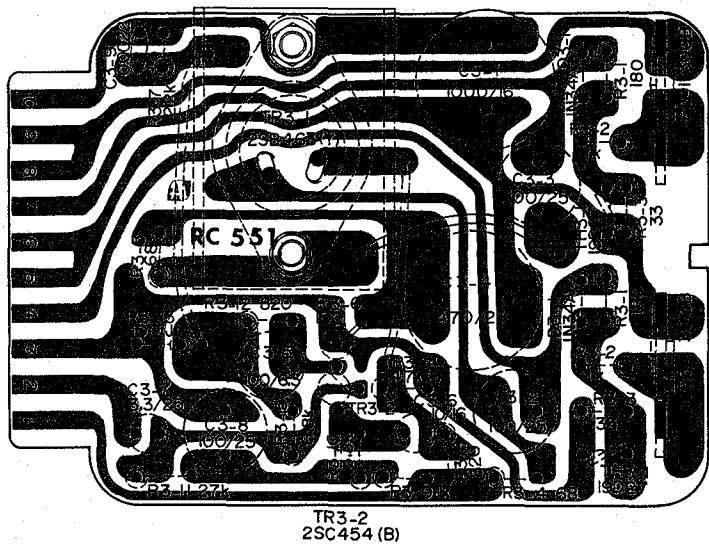
RC-550 P.B. PRINTED CARD
((B) (C) TYPE)



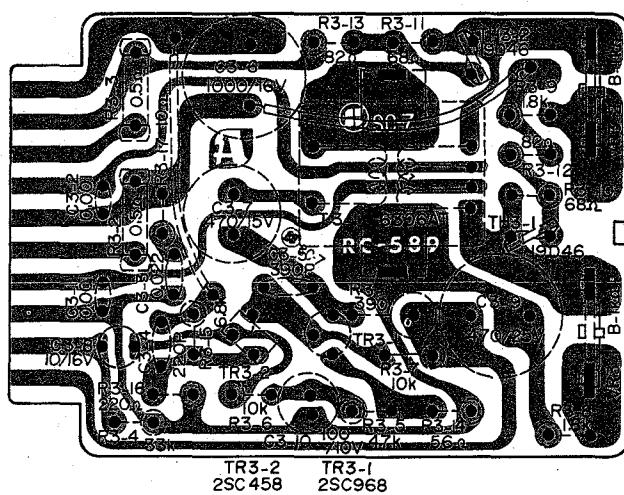
**RC-503 MAIN AMP. PRINTED CARD
((A) TYPE)**



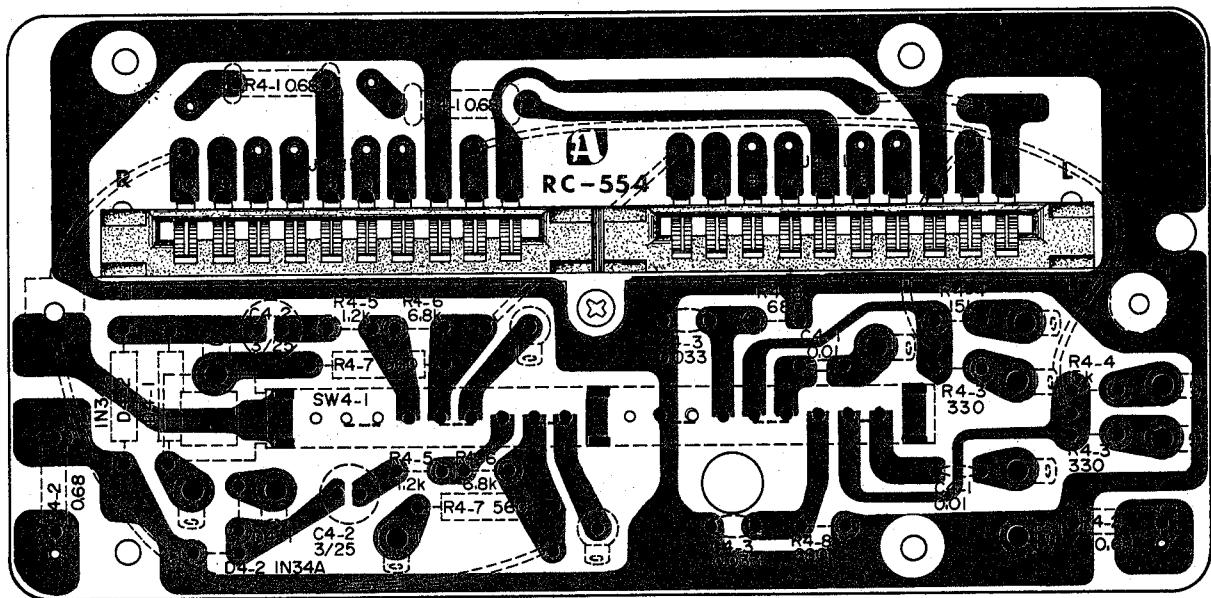
**RC-551 MAIN AMP. PRINTED CARD
((B) TYPE)**



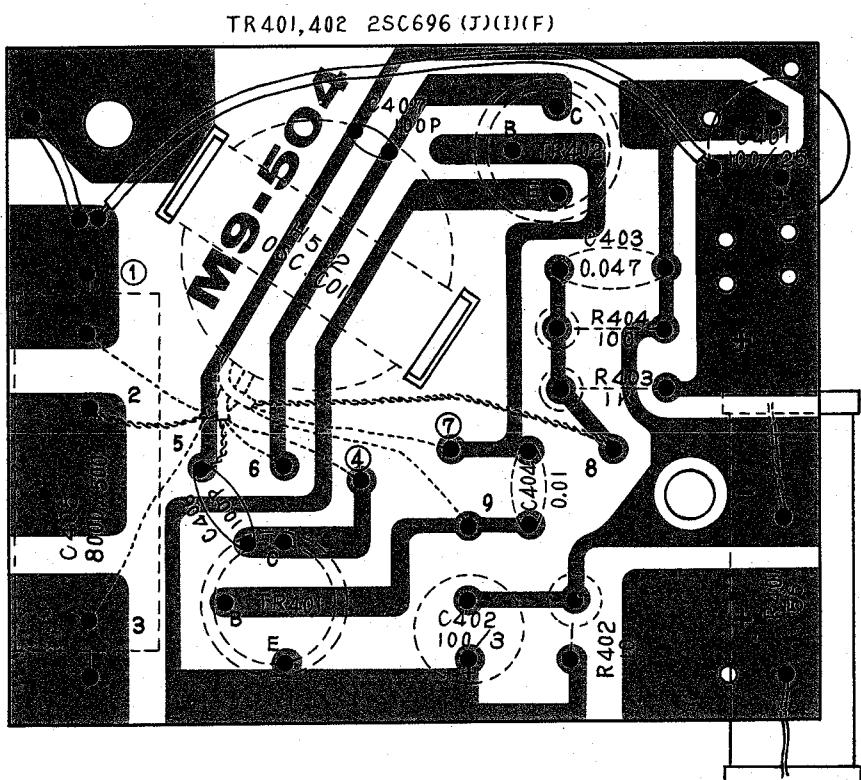
**RC-589 MAIN AMP. PRINTED CARD
((C) TYPE)**



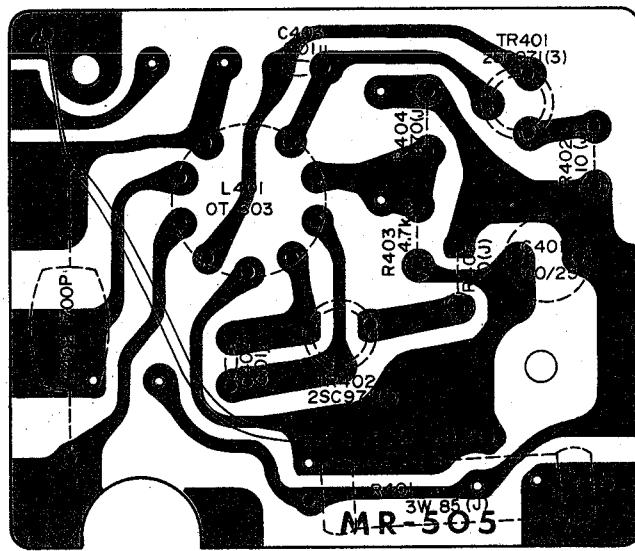
**RC-554 MAIN AMP. CHASSIS BOARD
((B) (C) TYPE)**



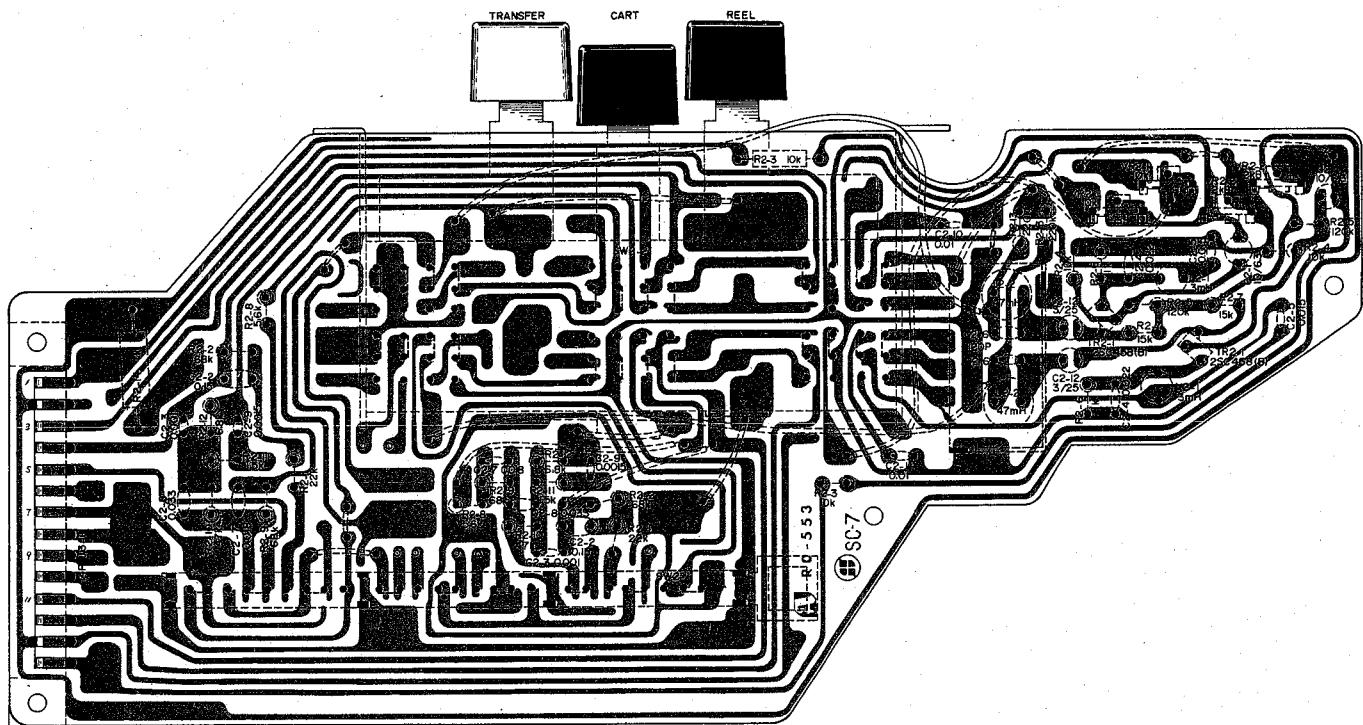
**M9-504 O.S.C. PRINTED CARD
((A) (B) TYPE)**



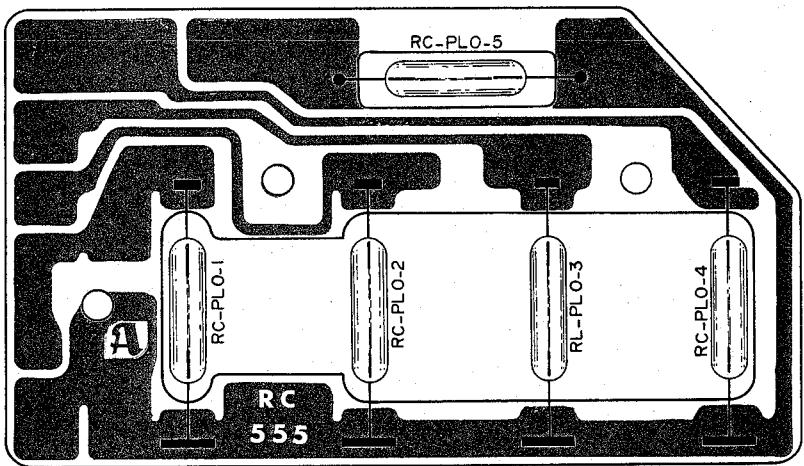
**MR-505 O.S.C. PRINTED CARD
((B) (C) TYPE)**



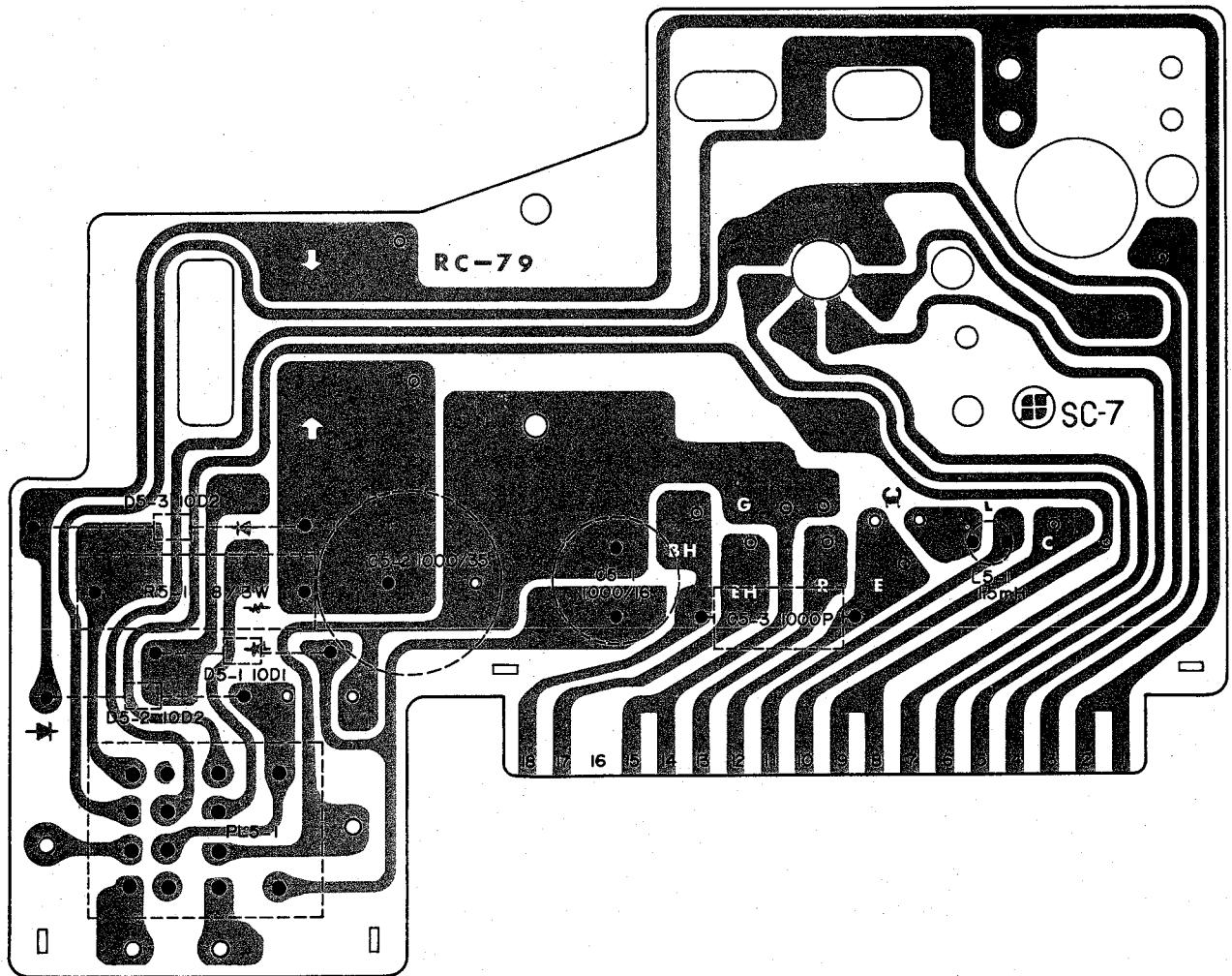
RC-553 REC. PRINTED CARD
((B) (C) TYPE)



**RC-555 LAMP PRINTED CARD
((B) (C) TYPE)**



**RC-79 CAPT. HEAD CARD
((B) (C) TYPE)**

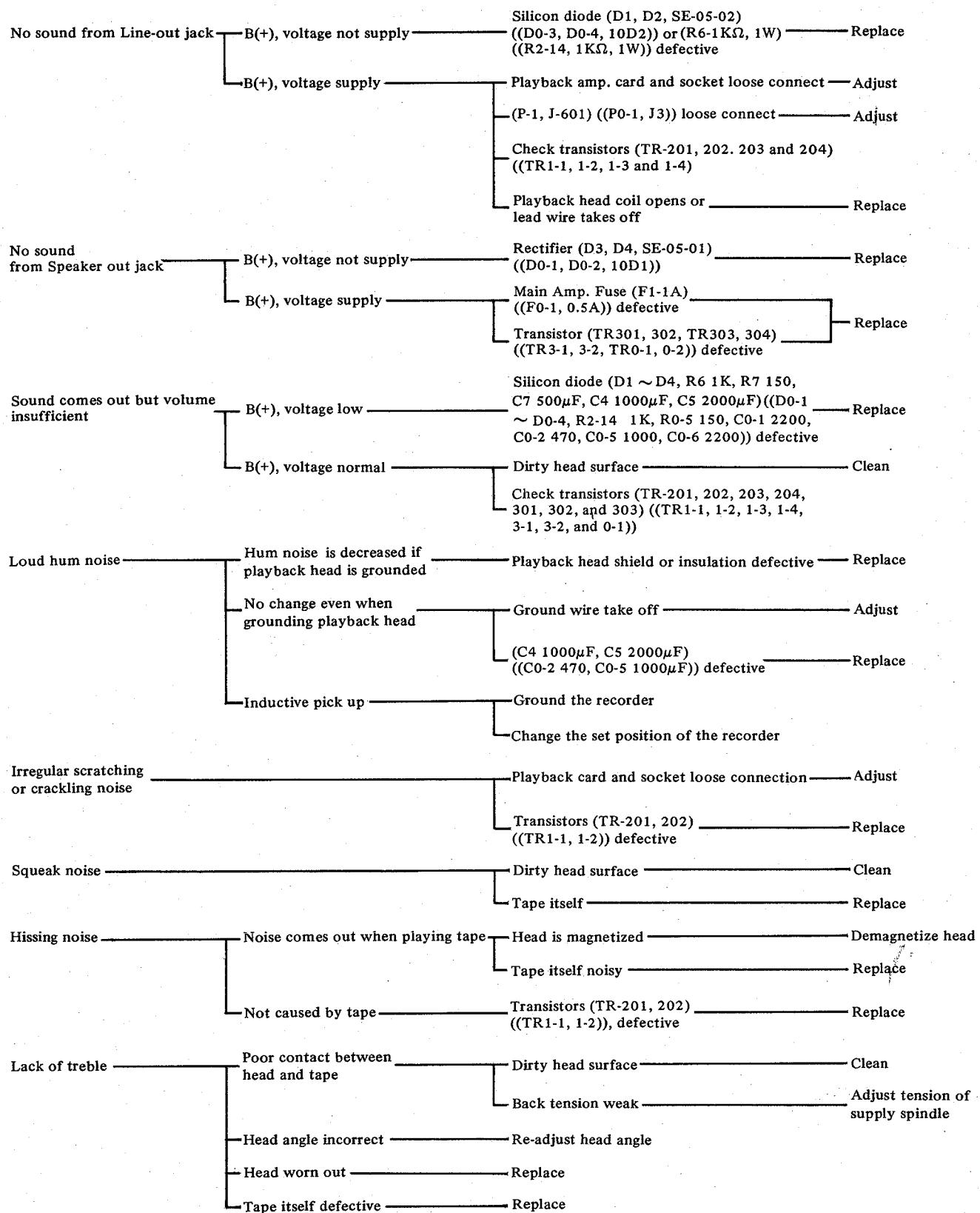


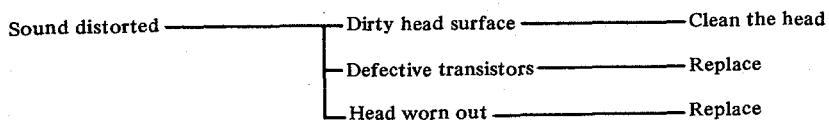
X. TROUBLE SHOOTING CHART

SECTION "A" TROUBLES WITH AMPLIFIER

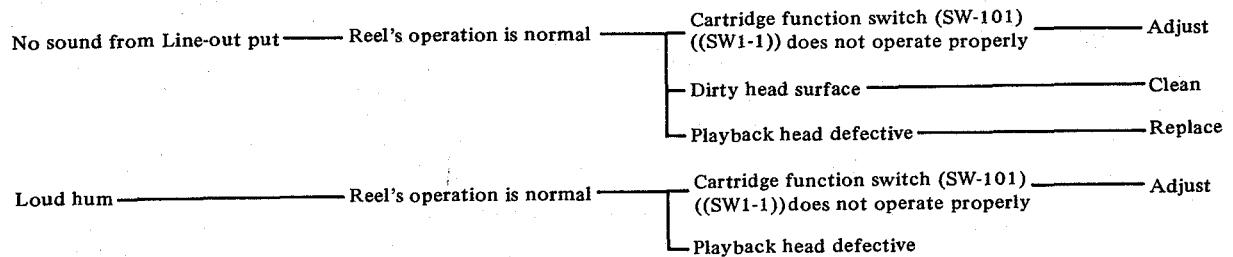
1. Playback problems. (Unit set in play position.)

a) Reel





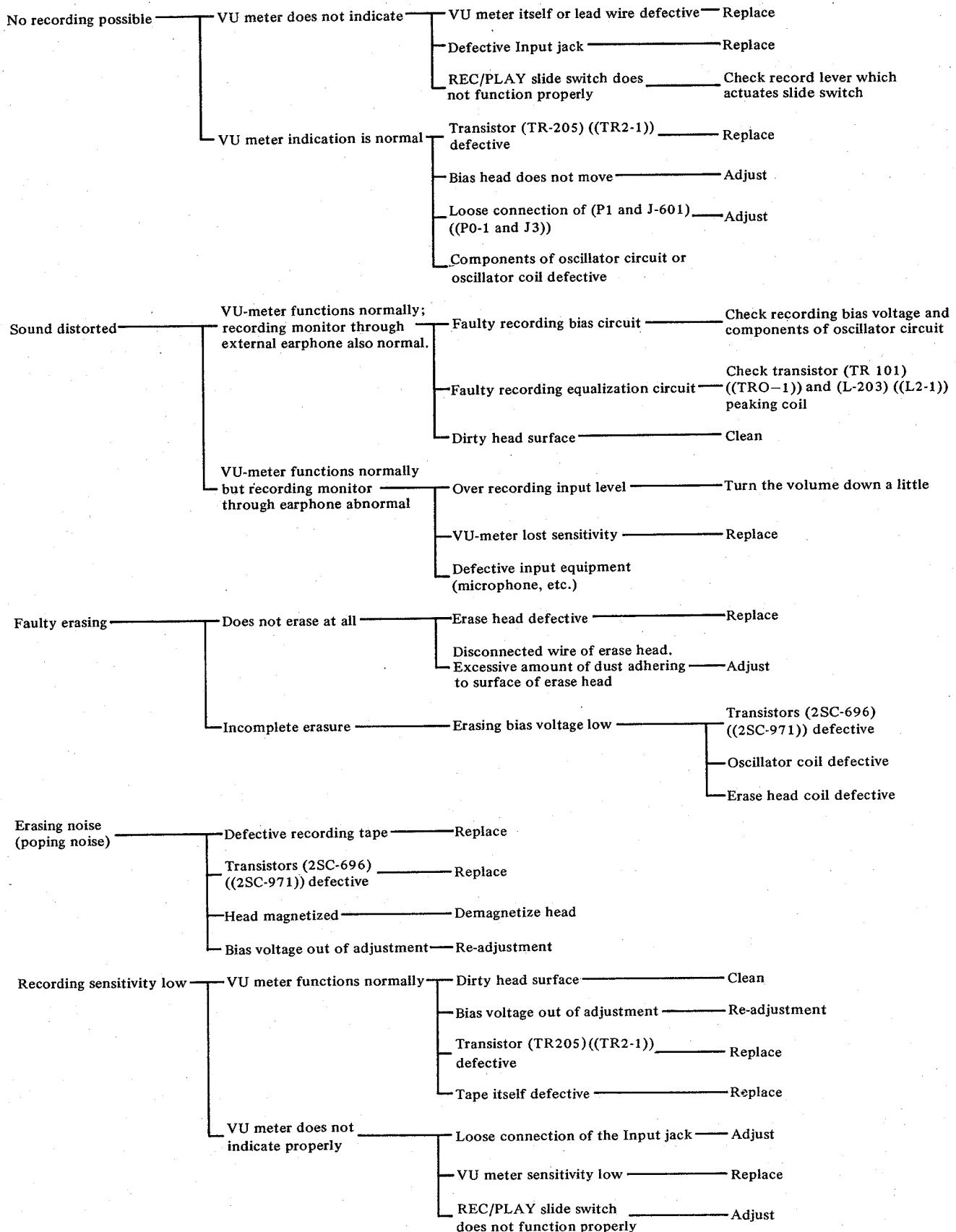
b) Cartridge



2. Recording problems.

(Unit plays back pre-recorded tapes okay, but recording not satisfactory.)

a) Reel



Sound fades or drops out

- Dirty head surface — Clean
- Tape itself defective — Replace recording tape
- Back tension too weak — Adjust the tension of supply spindle
- Recording bias voltage out of adjustment — Re-adjustment

Much difference recording levels between left and right

- Difference sensitivity of the line volume itself — Replace
- Recording level out of adjustment — Adjust (VR-3, 2K-B) ((VR2-2, 2K-B))

b) Cartridge

No recording possible

- Reel's operation is normal
- Cartridge function switch (SW 101) ((SW1-1)) — Adjust does not operate properly
 - Loose connection of (P2 and J-702) ((PO-2,3 and JS-1, 2)) — Adjust
 - Rec/Play Head defective — Replace

Sound distorted

- Reel's operation is normal
- Dirty head surface — Clean
- Cartridge function switch (SW-101) ((SW1-1)) — Adjust does not operate properly
 - Over recording — Adjust ((VR2-1, 10K))

Faulty erasing

- Does not erase at all
 - Erase head defective — Replace
 - Disconnected wire of erase head — Adjust
- Incomplete erasure
 - Dirty head surface — Clean
 - Erase head defective — Replace

Erasing noise (popping noise)

- Defective recording tape — Replace
- Head magnetized — Demagnetize head

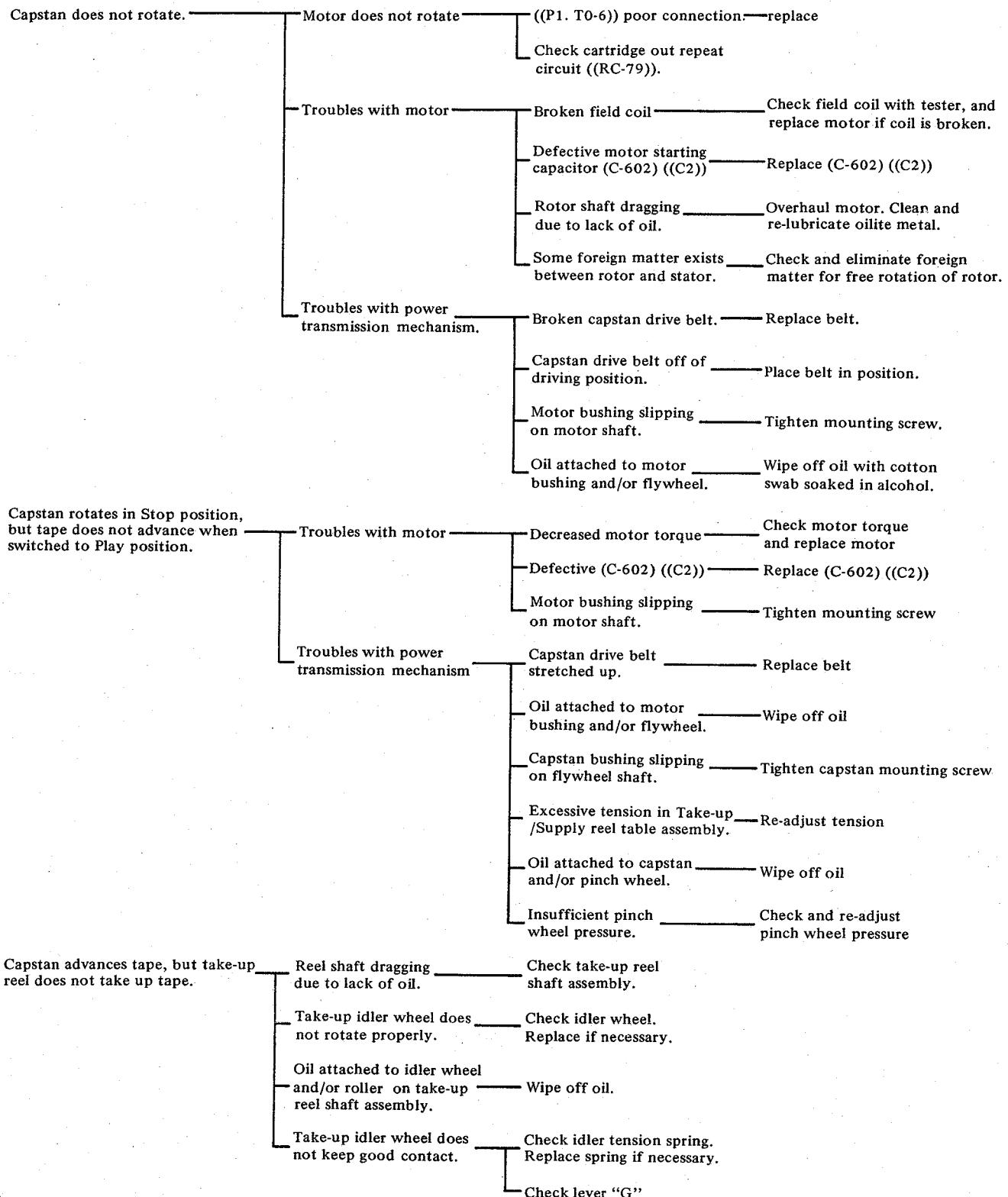
Sound fades or drops out

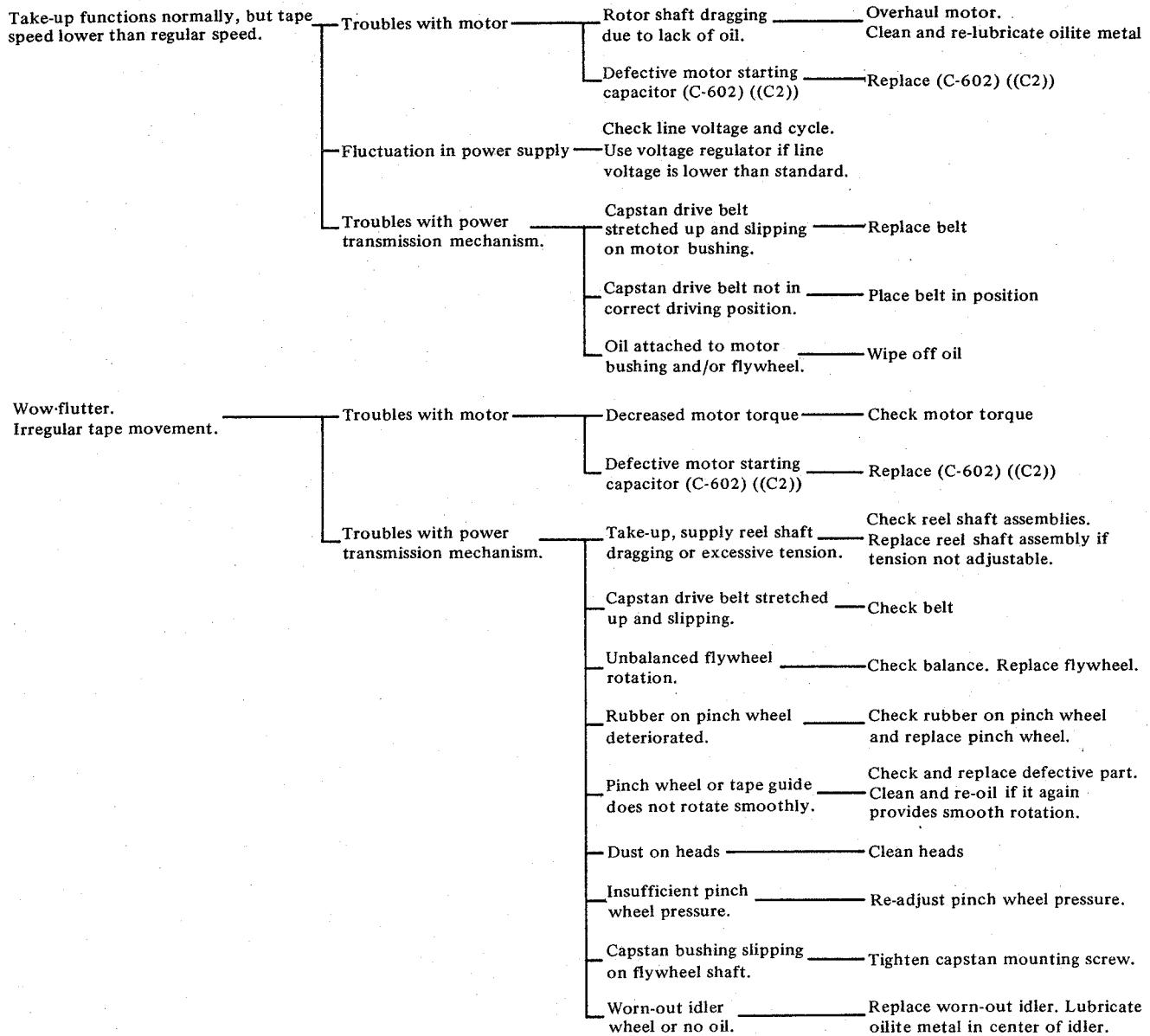
- Dirty head surface — Clean
- Tape itself defective — Replace

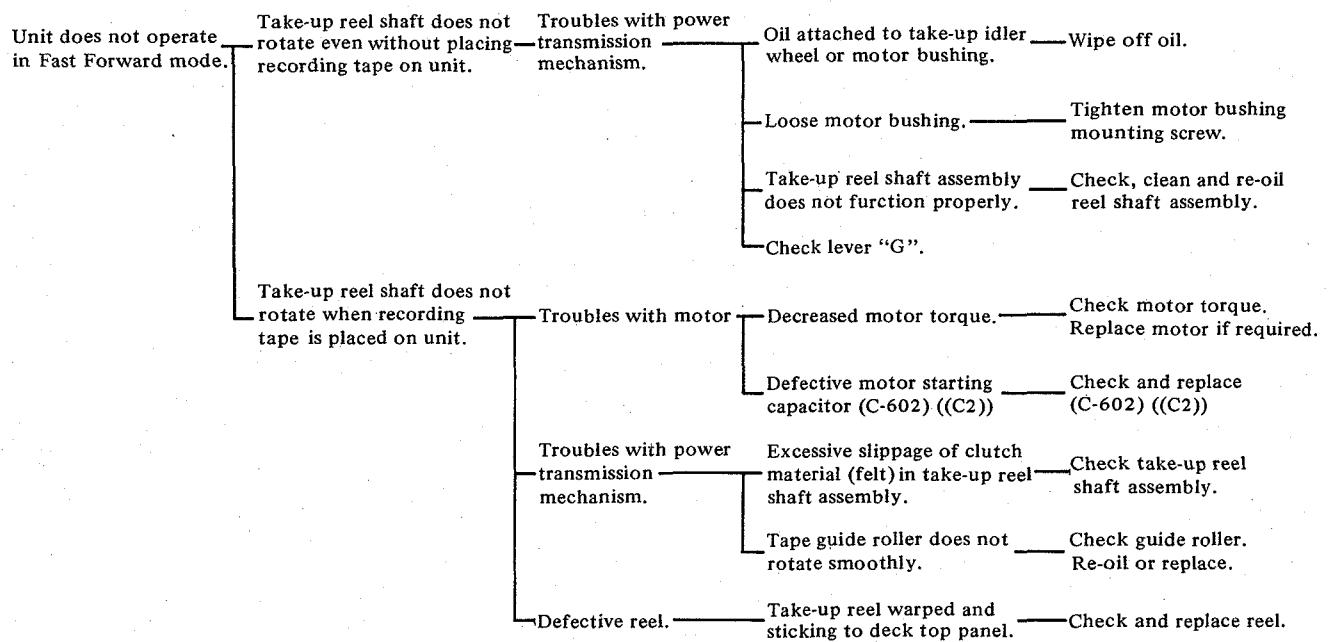
Does not Transfer at all

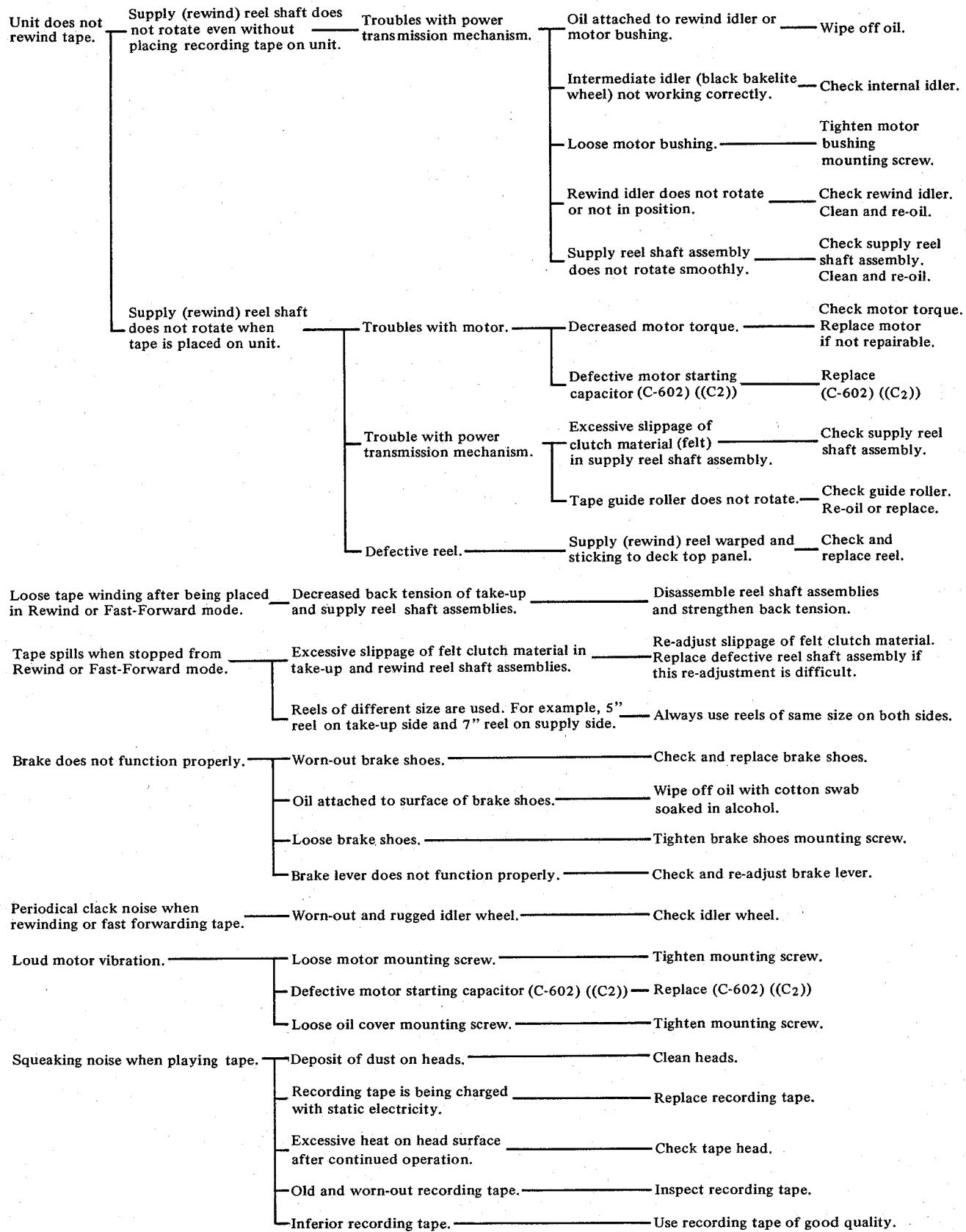
- Transfer function switch (SW-101) — Adjust does not operate properly

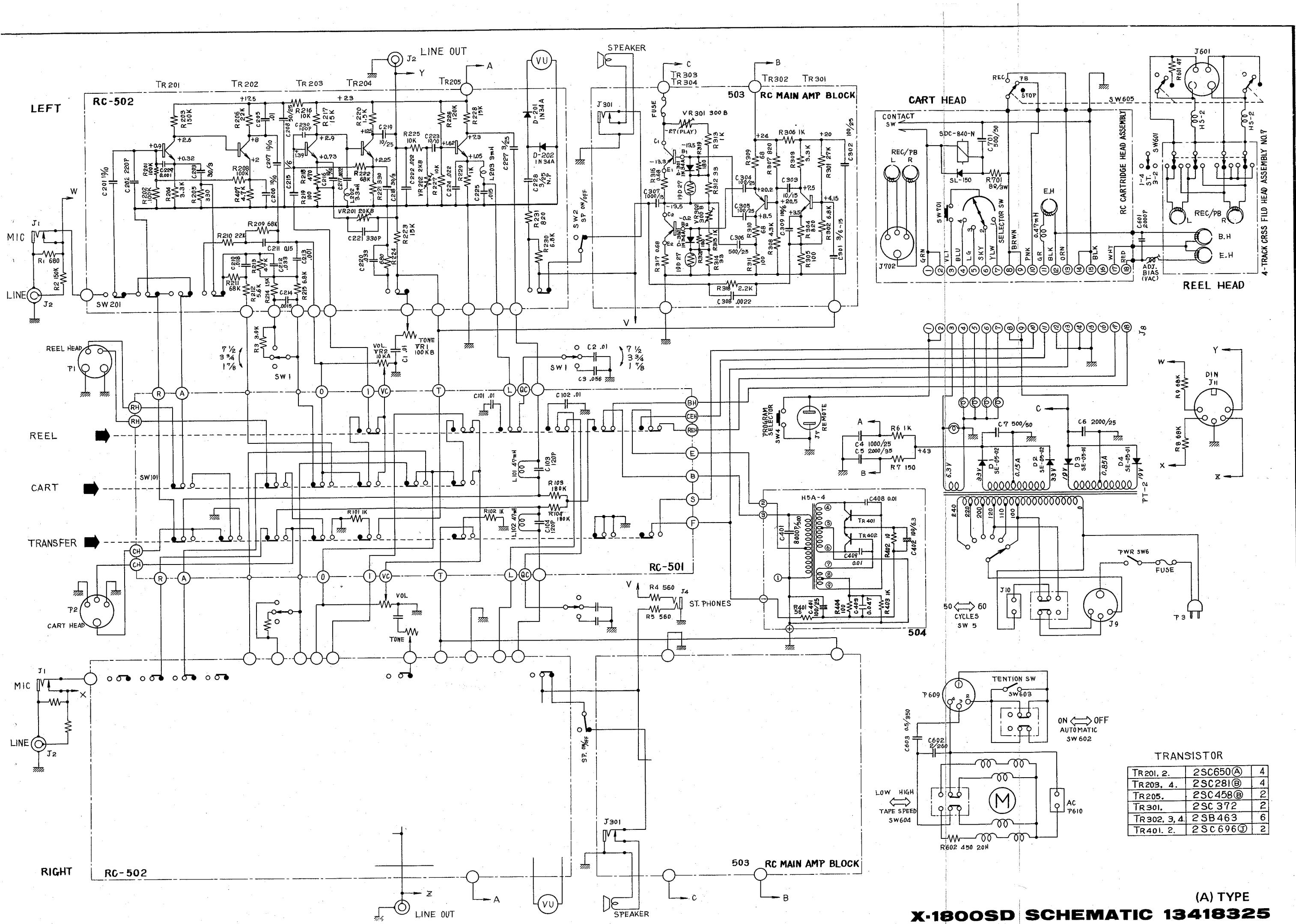
SECTION "B" TROUBLES WITH TAPE TRANSPORT MECHANISM

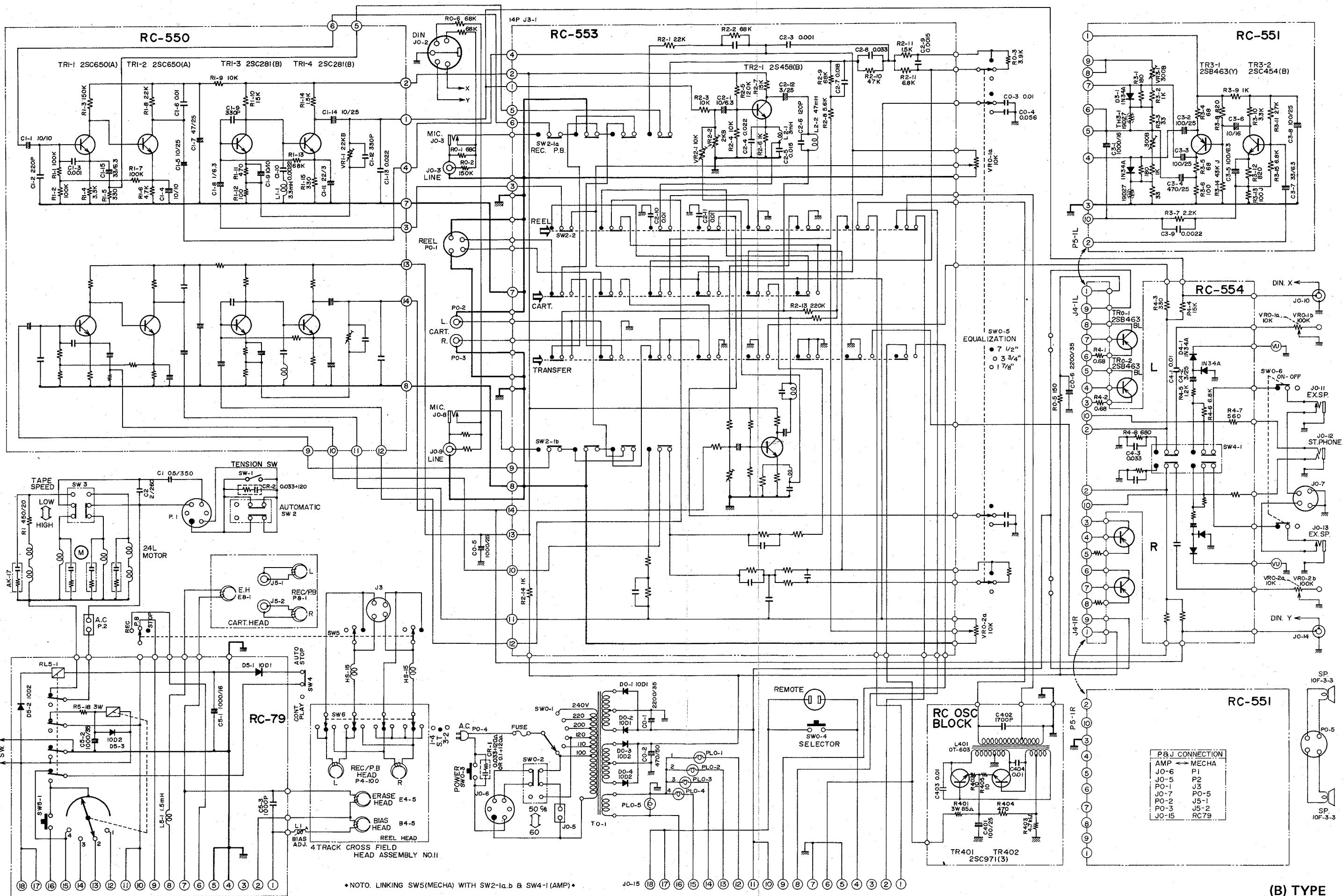






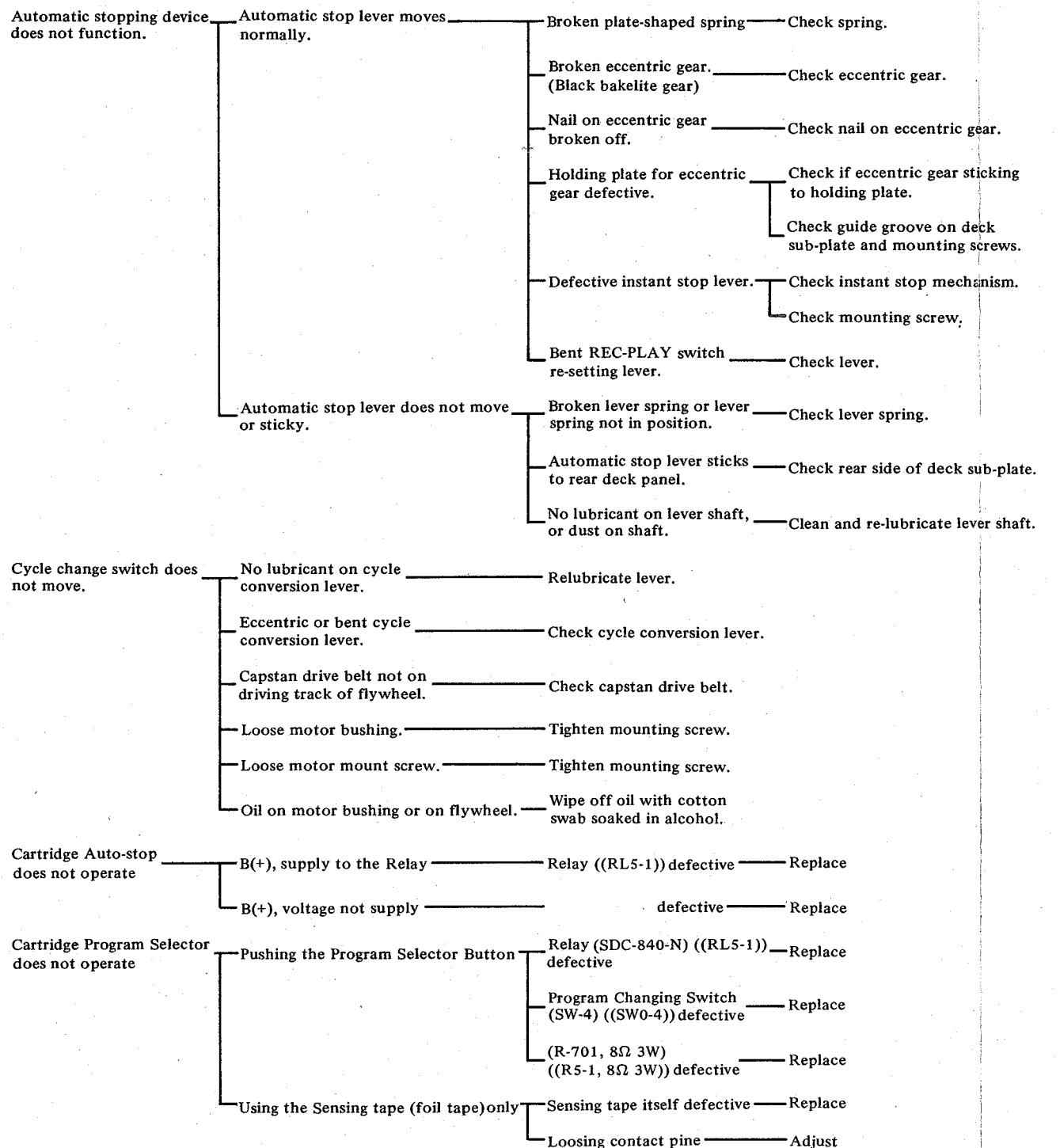




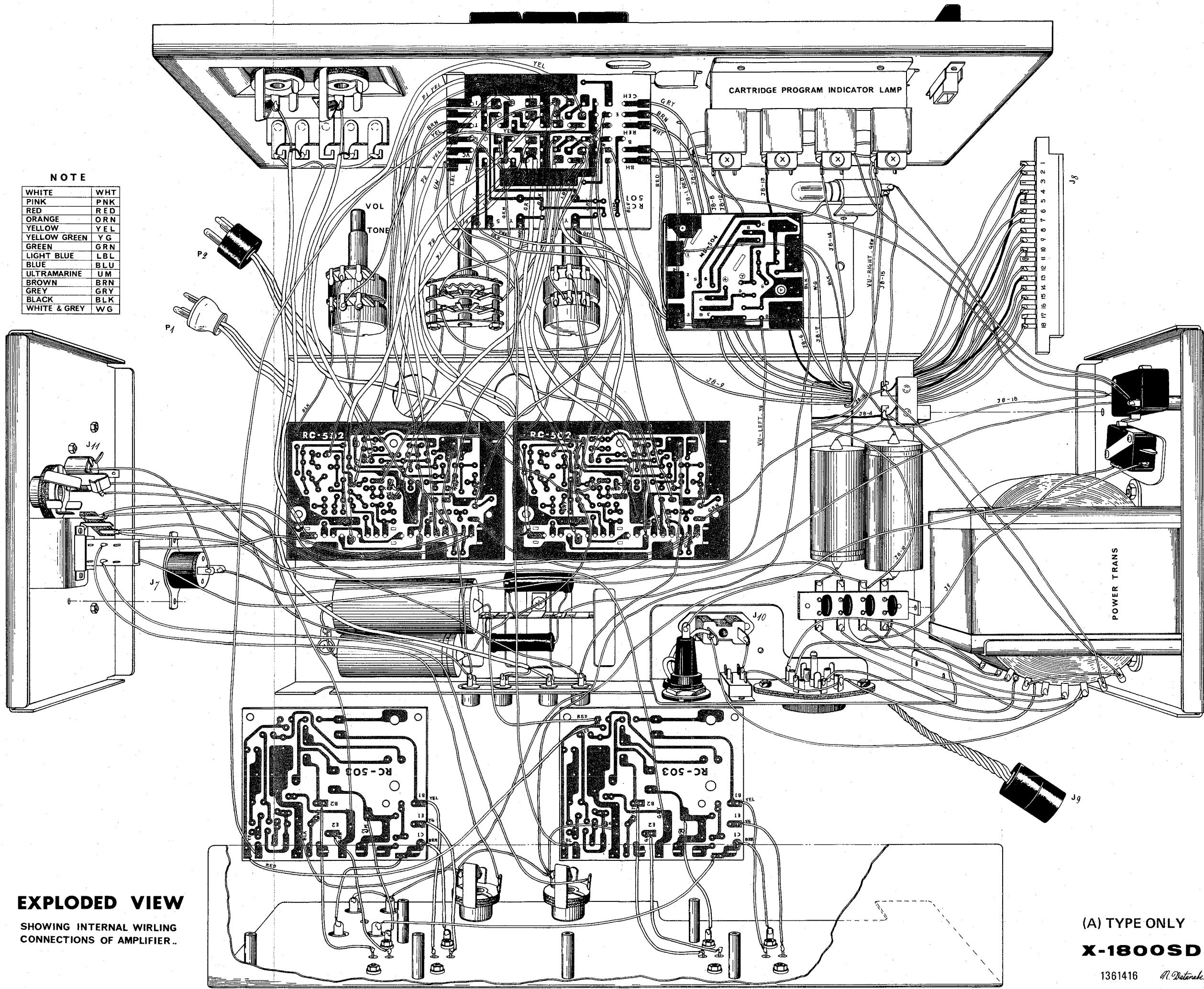


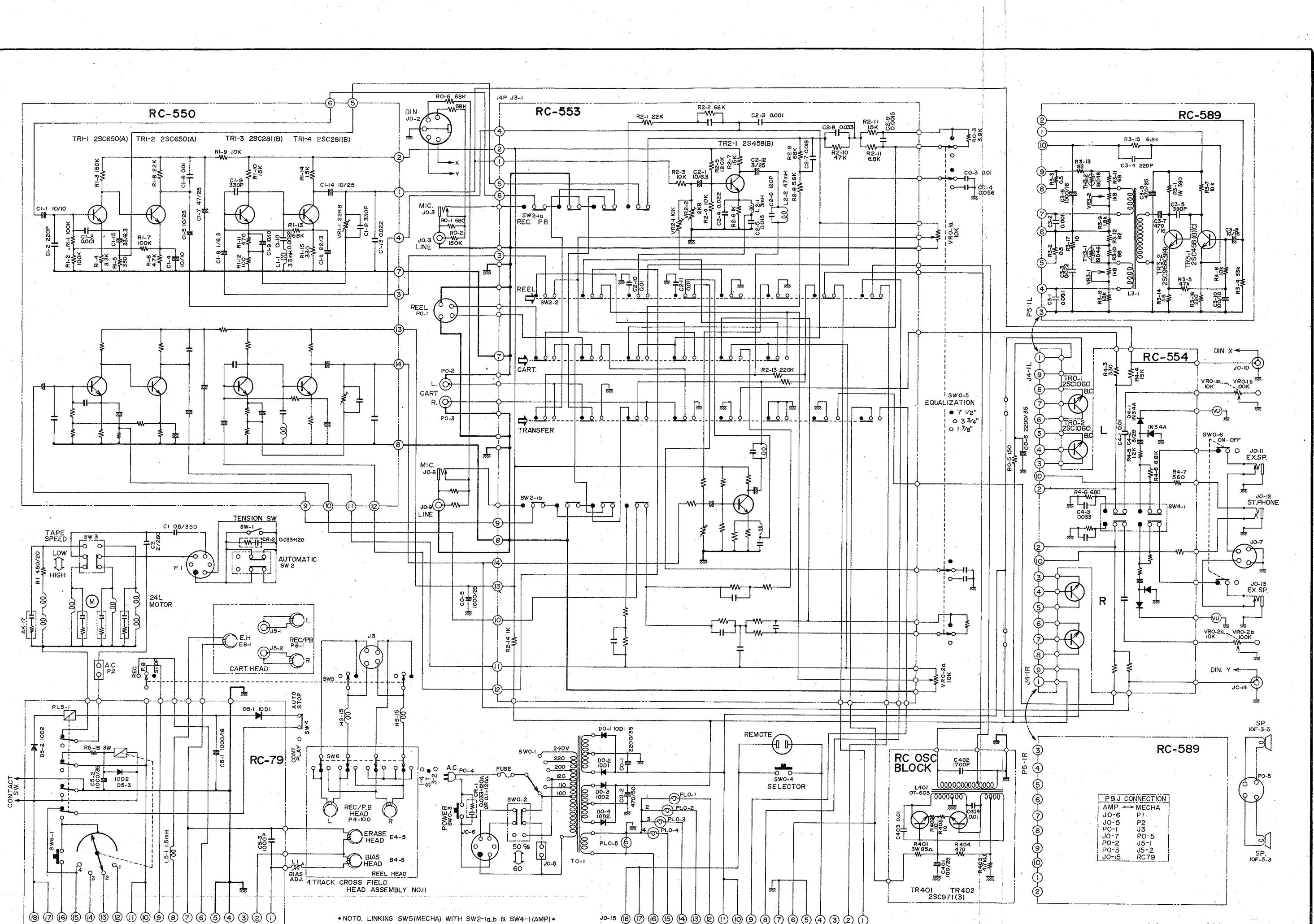
FOR THE ONE AFTER SERIAL NUMBER 66478

X-1800SD SCHEMATIC DIAGRAM I3624523



MEMO





FOR THE ONE AFTER SERIAL NUMBER 66478

X-1800SD SCHEMATIC DIAGRAM 13624524

